

CONTENT SPECIFICATION FOR DATA SERVICES

BELL SYSTEM PRACTICES

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1. GENERAL

SCOPE AND PURPOSE OF CONTENT SPECIFICATION

1.01 This specification defines and describes the contents of Bell System Practices covering data services, excluding those practices covering Teletype® equipment. The contents of the specification are to be used as a *guide* by Bell System personnel in planning BSP coverage for data services, as well as preparing and reviewing the practices. This specification does not include information on Task Oriented Plant Practices (TOPP). If specifications peculiar to data services are required for TOPP practices, they will be included at a later date.

1.02 This section is reissued to provide additional information on the levels of coverage required for data apparatus, stations, systems, and services. The content requirements of some sections have been updated to reflect current needs in support of data services. Unless stated otherwise, the term "apparatus" as used in this practice includes all data apparatus and equipment used in data stations, systems, and services. Because this is a general revision, change arrows have been omitted.

1.03 The volume of data services and the necessity for accurate and rapid service to the customer require the telco employees (craft employees) to be as effective as possible in installing and maintaining data apparatus. In addition to hiring and training qualified craft personnel, this requires that the employees be provided with clear, concise practices. These practices must be prepared in a style which permits quick retrieval and assimilation of information. Illustrations and tables should be employed and supporting text kept to a minimum where possible.

1.04 These practices have one basic purpose: to provide telco employees with the information and instructions necessary for effective job performance. The practices may be used to supplement classroom lectures and demonstrations, or by management personnel to gain an appreciation of the capability and characteristics of the equipment; however, these uses are secondary and usually do not influence the contents of the practices.

1.05 The information in this specification provides a basis for standardizing, to a certain degree, the contents of data practices so the employee will know what types of information to expect and in which practice it may be found. It must be emphasized, however, that standardization is desirable only if it does not detract from complete and coherent coverage of the apparatus. The peculiarities of the apparatus must determine what goes into a practice and how the material is arranged. The suggested arrangement of information and examples of types of information are based on typical cases and should be used in all cases except where variations are mutually agreed upon by all Bell System personnel involved in the preparation of the practices.

FUNCTION OF INSTRUCTIONS

1.06 The intent of this specification is to identify and define the basic criteria which must be considered during the planning and preparation of practices in order to properly decide what information should or should not be included in the practice.

1.07 The contents of data practices are described in terms of the assumed background, capability, and job responsibility of the intended user, and the relationship of the practice to others concerned with the same apparatus. Outlines suggesting a sequence of presentation and indicating the arrangement of the practice are included as

guides for organizing the practice contents. The normal coverage for each kind of data service, system, station, and apparatus is defined and the various types of practices which provide the coverage are identified.

COVERAGE FOR DATA SERVICES, SYSTEMS, STATIONS, AND APPARATUS

1.08 Figure 1 presents the hierarchy of BSP coverage which may be required for data services, systems, stations, and apparatus. The level and types of BSP coverage required depend upon the complexity, number, and types of apparatus (equipment) involved, and the application. Most data apparatus BSP coverage is provided in the numbering plan divisions 590 through 599; however, some (eg, central office, 312 division) coverage is located in other divisions. Test equipment used in the maintenance of data services is covered in various BSP divisions, eg, 103, 107, 666, 668. Selection of the proper division and layer will simplify the retrieval of BSP information by the user. Other divisions cover stations, systems, and services. The index for each division identifies each BSP in the division. This provides a starting point for the telco employee attempting to find needed information.

1.09 The various areas of coverage for data services and the coverage normally provided are described in (a) through (k).

(a) **Data Services:** Data services are definable categories or classes of data transmission that are provided by two or more individual systems, stations, or apparatus-coded units. (For example, switched network Dataphone® service, 150-baud private line service, or a group of data sets in a multipoint polling network could be included in this definition of data services.) Coverage for data services varies somewhat, depending on the type and complexity of the service. Some unique data services are covered in the 314 division. A data service which involves extensive engineering considerations may be covered in an Engineering and Implementation Methods System (EIMS). The content of these sections is not covered in this specification.

(b) **Data Systems:** Data communication systems consist of two or more data stations (or data sets, DSUs, CSUs, or terminals) and the connecting transmission and switching facilities.

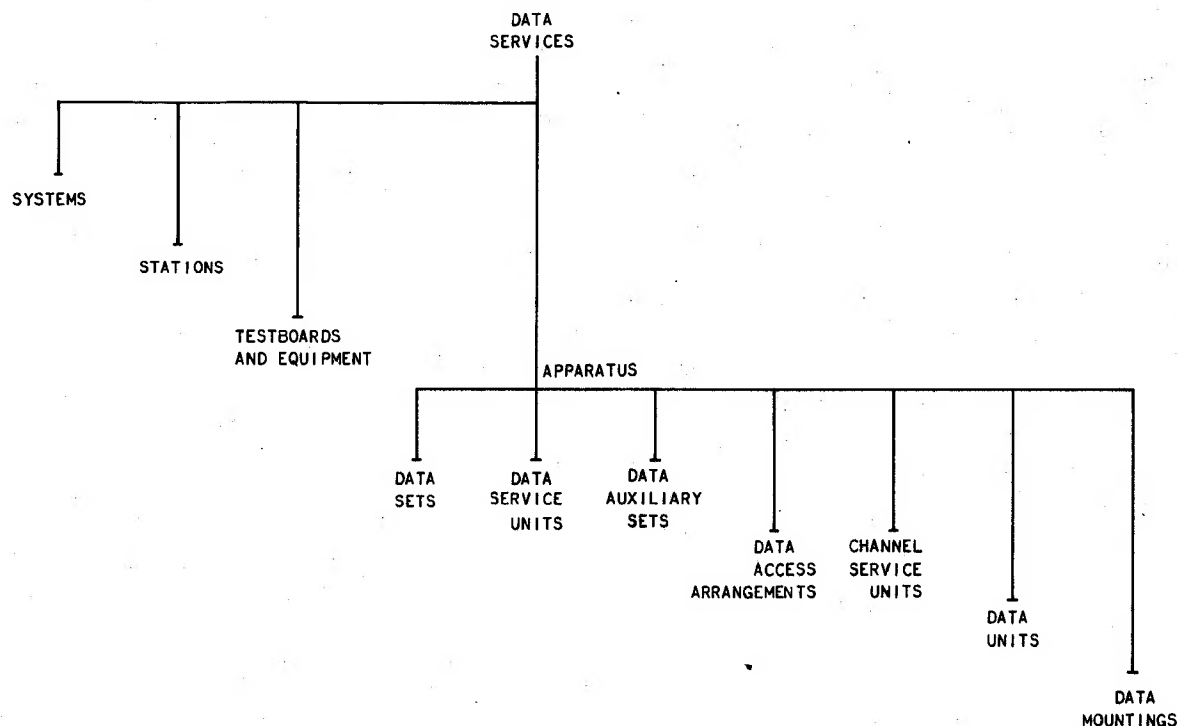


Fig. 1—Hierarchy of BSP Coverage of Data Services

For simple systems, the elements of a system are installed and tested individually, and the coverage, when required, is limited to a Description and Operation practice and a system Maintenance practice. For more complex systems, the coverage is on a system basis, and the total coverage required depends upon the complexity of the system. System level BSPs contain references to station or apparatus practices for details concerning the station or apparatus.

(c) **Data Stations:** Data stations are arrangements of coded apparatus which together perform all required communications functions for the associated business machine. If the apparatus which makes up a station must be installed, maintained, and operated in a specific manner, the detailed coverage is in a series of craft practices (59X-8YY-100, -200, -300, -500). Stations composed of common apparatus (ie, multiple-use data sets, data auxiliary sets, and data units) are not normally covered as a station, or are covered in general terms in the station practices

with references to the apparatus practices for detailed coverage.

(d) **Testboard and Equipment Practices:** Data services are supported by practices which cover testing and maintenance activities and may include the following.

- Description, operation, and maintenance of data test centers and systems in the 668 division. Each type of apparatus which is arranged for remote testing normally requires an Operation practice in the 668 division.
- Description, operation, and maintenance of testboards in the 666 division. Operation practices for specific apparatus are required (666-511) when unique test capabilities and/or requirements exist.
- Description and operation of portable test equipment in the 107 and 103 divisions. Maintenance and test information should be provided if field maintenance of the equipment

is recommended. Specific procedures for using the portable test equipment are normally provided in the test sections for the apparatus being tested.

(e) **Data Sets:** Data sets (DS) are coded apparatus which at a minimum provide a modulator and/or demodulator to transform business machine signals to line signals, and vice versa. Data sets may also include control and supervisory circuits on either a fixed or optional basis. Data sets which are used as a component of a station (eg, a modulator-demodulator that requires one or more data auxiliary sets to work properly) may be covered in detail in the station practices when the station installation, maintenance, etc, is unique. Individual coverage in these cases is provided in an Identification practice (59X-YYY-1ZZ). Data sets which provide all required functions without auxiliary units or with data auxiliary sets which are provided specifically for the data set are covered in detail in a series of craft practices (59X-YYY-1ZZ, -2ZZ, -3ZZ, -4ZZ, -5ZZ, or in the 312 division for central office data sets).

(f) **Data Auxiliary Sets:** Data auxiliary sets (DAS) are coded apparatus which provide the circuits required to control the operation of a data set or data station. They may also provide functions that are necessary or considered desirable for complete operation of a data set or data station, and for providing data services. Three types of data auxiliary sets must be considered so far as coverage is concerned. (1) Those which provide functions for one specific application (eg, a station controller for a specific data station) are covered in detail in the practices covering the primary apparatus. Individual coverage is provided in an Identification practice (598-YYY-1ZZ). (2) Data auxiliary sets which supplement the functions of another unit, and which must be installed and maintained as part of a station (eg, an attendant set for one or more codes of data set) are installed and maintained in accordance with the instructions in the practices covering the primary apparatus. Descriptive information and operating instructions are provided in a Description and Operation practice (598-YYY-1ZZ). (3) Data auxiliary sets which provide functions that are optional to the performance of the station or that provide functions which supplement the data transmission facility (eg, automatic calling units or channel interface units) and sets which

are installed and maintained individually (eg, the attendant set for a multiple station using any of several types of data set) are covered in detail in a series of practices (598-YYY-1ZZ, -2ZZ, -3ZZ, -4ZZ, -5ZZ).

(g) **Data Service Units:** Data service units (DSU) are coded apparatus used in the Digital Data System to convert customer serial unipolar data signals to bipolar signals for transmission over the local channel to the serving central office and to convert signals from the local channel into serial unipolar signals for customer use. These units are covered in a series of practices similar to data set coverage (595-2YY-1ZZ, -2ZZ, -3ZZ, -4ZZ, -5ZZ).

(h) **Data Access Arrangements:** Data access arrangements (DAA) are coded apparatus which provide access to telephone company facilities (either private line or DDD) for customer-provided data apparatus. The arrangement will consist of a network protective device (coupler), and in the case of DDD access, a network signaling device. Complex arrangements may require a full set of craft practices (59X-YYY-1ZZ, -2ZZ, -3ZZ, -4ZZ, -5ZZ); however, most arrangements may be covered in one combined practice. The combined practice contains (under part headings) the same type of information and instructions included in each individual craft practice.

(i) **Channel Service Units:** Channel service units (CSU) are coded apparatus used in the Digital Data System to provide duplex access for the customer to the channel to the central office. These units provide network protection and require that the customer provide data signals that are compatible with the channel. BSP coverage of these units is similar to coverage provided for data service units (595-1YY-1ZZ, -2ZZ, -3ZZ, -4ZZ, -5ZZ).

(j) **Data Unit:** Data units (DU) are coded assemblies which provide circuits required to perform a function that contributes to the operation of a data set or data auxiliary set. Data units are normally covered by an Identification practice (590-100-ZZZ) for reference purposes. For those data units associated with a specific piece of data apparatus, the series of practices covering the apparatus contains detailed information.

General purpose data units may also require a Wiring Information practice (590-100-4ZZ).

(k) **Data Mounting:** Data mountings (DM) are coded subassemblies intended primarily to provide mechanical facilities for mounting other apparatus in a cabinet or other supporting structure. The mounting may include wiring and circuitry which contribute to or complete a function provided by the other apparatus. Data mountings are covered in an Identification practice (590-102-ZZZ) for reference purposes, and in detail in the practices covering the arrangement in which the data mounting is used. Complex mountings which are used in several applications may also have a Wiring Information practice (590-102-4ZZ).

1.10 In addition to the previously described practices, DSs, DSUs, DAAs, and DASs are covered in Reference Guides (590-00Y-ZZZ). Supplementary Information practices (59X-YYY-15Z) will be provided for data sets, data stations, and data systems whenever this type of coverage is considered necessary.

1.11 Data stations, systems, and in some cases, services require practices to specify the engineering considerations and hardware restrictions involved with certain configurations of the equipment. This information is presented in an Equipment practice.

1.12 A Summarizing Specification (59X-YYY-18Z) is prepared for data sets, data auxiliary sets, and data stations as product engineering application specifications. These practices provide information for selection of the features offered for the apparatus or station, and instructions for ordering the codes required to implement the selected features. Equipment practices and Summarizing Specifications are the responsibility of Bell Telephone Laboratories.

1.13 Unusual circumstances may at times require additional coverage for data apparatus or stations, for example, wiring diagrams (59X-YYY-4ZZ) or disassembly and reassembly instructions (59X-YYY-7ZZ). The contents of these practices should be established according to the specific need and with the agreement of all involved personnel.

STANDARD CONTENTS

1.14 The contents of certain paragraphs are common to all types of practices. These paragraphs and their contents are described in (a) through (d).

(a) **Table of Contents:** A table of contents is normally included in practices which are more than four pages in length.

(b) **Standard Practice Information:** Paragraph 1.01, and if necessary, subsequent paragraphs in each practice, define the scope and purpose of the practice. The contents of this paragraph should provide for the reader a general knowledge of what he can expect to find in the practice and the depth of the information.

(c) **Reissue Paragraph:** In reissued practices the reasons for the reissue are stated immediately following the scope and purpose information (normally in 1.02). This information is intended to help the reader locate and understand the changes which required the reissue, allowing him to concentrate his time and effort in determining how he will be affected by the change.

(d) **Introduction Paragraphs:** Each major topic in a practice or in a part should be introduced to the reader to help him make the transition from what he has just read to what he will be reading. The introduction will also connect general coverage of the topic to the detailed coverage.

2. REFERENCE GUIDES

GENERAL

2.01 Reference Guides are written for data sets, data access arrangements, data auxiliary sets, data stations, and data services. They are brief summaries, in both text and tables, of the more pertinent functions and features of data apparatus or services.

2.02 Reference Guides are primarily used by the telco personnel responsible for determining the proper apparatus or arrangements of apparatus for a particular customer requirement. Proper use of Reference Guides permits marketing personnel to advise customers more effectively and engineering

personnel to select the apparatus that will meet customer requirements more easily, and provides standard nomenclature to improve communications between the various individuals and organizations (engineering, plant, etc) in the telephone company involved with data services. Reference Guides also contain substitution information which permits the telephone companies to utilize spare stocks more economically.

CONTENTS

2.03 The information in the Reference Guide is normally in five parts: Part 1, General; Part 2, Physical and Electrical Characteristics; Part 3, Service Order Information; Part 4, Conversion and Disposition Information; and Part 5, References. A front, three-quarter photograph showing the general appearance of the apparatus and the location of the handset, dial, and control buttons precedes Part 1. If necessary because of space considerations, the physical characteristics of the apparatus (size and weight) may be shown on the photograph. The photograph should be sized to present as clear an illustration of the apparatus as possible within the constraints of available space.

2.04 Part 1, GENERAL, provides a brief functional description of the apparatus. *The description should emphasize the service provided to the customer and the application of the apparatus rather than technical details of operation.* Information such as data rates, type of service (switched or private line), modes of operation, interface signal characteristics, means of controlling the apparatus (under control of the business machine, associated data auxiliary set, etc), should be included. If the apparatus is available in more than one model, each model should be identified and the pertinent feature noted. The description should provide marketing personnel with the basic information required to determine that the apparatus will satisfy customer service requirements. The description will also serve to remind engineering and other personnel of the characteristics of the apparatus.

2.05 Part 2, PHYSICAL AND ELECTRICAL CHARACTERISTICS, describes the apparatus in terms of the facilities that the customer must provide to install and power the apparatus. The description includes power requirements, type of receptacle required, size and weight of the apparatus, physical appearance (color and material used), and

environmental limitations. For service-oriented Reference Guides, this part should include only the differences between apparatus (data sets) which can provide the service.

2.06 Part 3, SERVICE ORDER INFORMATION, provides the information necessary to complete the service order properly. This information should permit the marketing employee to specify precisely the service required rather than the hardware. Plant and engineering personnel can select the hardware to implement the service in the most economical way from the information contained in the guide. The information is normally presented in three tables and associated explanatory text.

2.07 The first table, Service Offering—Usable Data Sets, lists the available models in a 4-column format. The columns are headed USOC, FEATURE, USABLE DATA SETS, and REMARKS. The usable apparatus codes are listed in the USABLE DATA SETS column, eg, 201B1, 201B2. The feature that distinguishes one USOC from the other is listed in the FEATURE column, eg, internal timing, external timing, rotary dial, Touch-Tone® dial, etc. The USOC (Universal Service Order Code) column contains the basic, 3-letter USOC designation for the service provided by the apparatus. All data apparatus codes, including current models and older models which can provide the service described by the USOC, should be listed. Restrictions or other considerations should be referenced in the REMARKS column and included as notes to the table.

2.08 The second table, Customer Options, provides the information required to decide on and identify the optional features required by the customer. There may be a need for more than one customer option table in service-oriented reference guides where there are major categories of service, such as switched network versus private line, etc. The decision table is used in conjunction with the Universal Suffix Table in the section entitled Reference Guides—General Instructions (590-000-100) to develop a 2-digit suffix to the basic USOC designation. The suffix describes precisely the optional features required by the customer. The information is normally contained under three headings, labeled DECISION, OPTIONS, and DESIGNATION (where applicable). The DECISION column contains the letters A through F, as necessary, which identify the specific decision to be made. Other customer choices or restrictions must be added as additional customer information,

with the stipulation that they be included in the REMARKS column of the service order. The OPTION column contains the alternative options associated with each decision, numbered sequentially from the top to the bottom of the table. The DESIGNATION column contains the letter (or other) identification of the option for each data set capable of providing the service. Some decisions may be worded in such a way that they do not represent a specific option in a data set. In this case, the designation would not apply. The table may be introduced and explained in the text preceding the first table. Text following the second table should describe the customer options and the circumstances which determine their selection.

2.09 A third table, Telco Engineering Options, has two columns, OPTION and DESIGNATION, which identify the options which are controlled by the telephone company plant facilities.

2.10 Part 4, CONVERSION AND DISPOSITION INFORMATION, identifies any significant changes that have been made throughout the life of the data apparatus resulting in series number changes. Only those changes which need to be considered in selecting or substituting a unit for a particular service are considered. Recommendations on updating and disposing of older apparatus should be included. A table with columns headed SETS IN SERVICE, COMMON MAINTENANCE SPARES, and NOTES and showing the number and code of data sets or maintenance kits recommended for field stock to support existing installations should be provided if this information is available.

2.11 Part 5, REFERENCES, lists drawings, Bell System Practices, and other documents which contain information concerning the apparatus.

REFERENCE GUIDE TYPICAL OUTLINE

Halftone Illustration of Data Apparatus

1. GENERAL 1.01 Functional description of service provided by the data apparatus. 1.02 Revision notice (if needed). 2. PHYSICAL AND ELECTRICAL CHARACTERISTICS 2.01 Power requirements and physical description. 3. SERVICE ORDER INFORMATION 3.01 Introduction to Tables A and B. <ul style="list-style-type: none"> • TABLE A – SERVICE OFFERINGS – USABLE DATA SETS • TABLE B – CUSTOMER OPTIONS (More than one table may be required) 3.02 Introduction to decision descriptions. (a) <i>DECISION A –</i> 1. <i>First alternative:</i> 2. <i>Second alternative:</i>	(b) <i>DECISION B –</i> 3. <i>First alternative:</i> 4. <i>Second alternative:</i> (c) Same format as (a) and (b). 3.03 Introduction to Table C. • TABLE C – TELCO ENGINEERING OPTIONS (More than one table may be required) 4. CONVERSION AND DISPOSITION INFORMATION 4.01 Introduction to Table D or paragraph explaining changes to apparatus. • TABLE D – DATA APPARATUS SERIES CHANGES • TABLE E – MAINTENANCE SPARE GUIDELINES (As Required) 5. REFERENCES 5.01 Introduction and list of drawings and documents.
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3. SUMMARIZING SPECIFICATIONS

GENERAL

3.01 Summarizing Specifications (59X-YYY-18Z) are prepared by BTL physical design for data sets, data auxiliary sets, data service units, channel service units, and data stations as product engineering application specifications. They provide information for application and ordering of data apparatus for use in the Bell System, and list applicable and supplementary practices, specifications, and drawings.

3.02 In general these specifications are issued to provide the following:

- (a) Information necessary to Operating Company personnel in selecting and ordering the

required products to meet their needs for a particular service

(b) A brief description and explanation of the features available in the product and the application of the product containing these features in the telephone plant

(c) A listing of the authorized product codes orderable from the Western Electric Company and their ratings

(d) Reference to applicable circuit and physical arrangement drawings

(e) Reference to supplementary practices, specifications, drawings, etc.

CONTENTS

3.03 The basic information in the specification is presented in six parts: Part 1, General; Part 2, Supplementary Information; Part 3, Drawings; Part 4, Product; Part 5, General Notes; and Part 6, Reasons for Reissue. Additional parts as described in the following text may be included when required.

Note: Inapplicable parts should be omitted and subsequent parts renumbered. For example, Part 4, PRODUCT, would not be required when covering a data station; therefore, Part 4 would be omitted and Parts 5 and 6 renumbered.

3.04 Part 1, GENERAL, provides, in addition to the standard information concerning the practice, background information concerning the data apparatus or station. If applicable, a subpart heading, CAPACITY or FEATURES, may be included. Information concerning the capacity of the set or station, operating range, etc, should be covered in tabular form. The power requirements for the unit may be presented under a subpart heading POWER REQUIREMENTS. A subpart heading DESCRIPTION may also be included if required. This description should provide information of an application nature to aid in the selection of the proper product code for the required service. This might include operational features and limitations, testing and maintenance features, power limitations, spare products and modification of existing products. The description should *not* duplicate the functional description in the Description practice (59X-YYY-1ZZ) associated with the unit.

3.05 Part 2, SUPPLEMENTARY INFORMATION, includes all reference information associated with a data set Summarizing Specification. This information should include the following:

- (a) Numerical index of Product Design Requirements and Engineering Information
- (b) Bell System Practices for associated products and test equipment
- (c) J Specifications for equipment-coded products with corresponding BSP sections in parentheses
- (d) Manufacturing Test Requirements Specifications
- (e) Performance Requirement Specifications

(f) Bell Systems Repair Specifications

(g) Outside supplier's apparatus—KS Specifications

(h) Floor plan data sheet information

(i) Interface information.

3.06 Part 3, DRAWINGS, lists all schematics (SD or ES) covering the product, its subassemblies, and component apparatus and application. A list of information and product arrangement (ED) drawings is also included. The (A) drawings should *not* be listed.

3.07 Part 4, PRODUCT, contains the lists associated with the product. The product type and title should head the listing. Each list should be identified with a brief description and the schematic and apparatus figures covering the list. Any special ordering information such as "Required in addition to List 5", or "Specify only if List 5 is specified," is included. Lists should appear in numerical order.

3.08 Following the list descriptions, a table or listing must be provided of each authorized, orderable code number with the rating of each combination, and if A&M only, the replacing or superseding codes.

3.09 For identification codes that cannot be described by a single list, a summary of the orderable apparatus and equipment should be provided. Following this, the apparatus and equipment together with the rating and number required should be listed in tabular form.

3.10 Current issues of specifications should include a listing of all product codes in the Table of Authorized Orderable Code Numbers that are rated A&M Only. All product codes that are rerated to Manufacture Discontinued (MD) should be removed from this list in the issue in which they are so rated and shown in Part 5, GENERAL NOTES. Where rerating to MD is handled by means of an addendum, the removal should be accomplished in the next issue. All codes and lists on an A&M Only and MD basis must, however, be referred to for record purposes under the subheading, List of A&M Only and Manufacture Discontinued Data Sets, which follows 5, GENERAL NOTES.

3.11 Part 5, GENERAL NOTES, contains notes having a general application to all product

codes in the specification. The notes should be self-explanatory without referring to the description of individual list numbers under the product codes. Where numerous notes are required, they should be grouped under appropriate subpart headings such as Products, Wiring, Schematic, etc.

- (a) The subpart heading, LIST OF AUTHORIZED MFR DISC. PRODUCTS, should be used when discrete codes are authorized as MD. This heading and its text material should always be unnumbered and should follow the notes of Part 5, GENERAL NOTES. This subpart provides a record of all apparatus codes assigned under Part 4, PRODUCT, that have been rerated to A&M Only or MD, including any codes assigned but never produced. The respective replacements for the rerated items should also be recorded. The records must be kept beginning with the first revision of a specification in which the rating is changed and continued through *all*

subsequent revisions, except when a code is reinstated.

- (b) The rerating information under the subpart heading should be in tabular form as shown below. Items listed are typical and indicate the various conditions that may be encountered.

3.12 Part 6, REASONS FOR REISSUE, is used in addition to the short statement regarding reasons for reissue in Part 1 [see 1.14(b)], when lengthy statements involving detailed reasons for reissue are necessary. When required, it should follow the List of A&M Only and Manufacture Discontinued Products heading. The information under this heading should be listed in the order that affected items appear in the specification. These paragraphs should contain reference to the changes in the specification, such as features and code numbers added or removed.

SUMMARIZING SPECIFICATION TYPICAL OUTLINE

1. GENERAL

1.01 Scope and purpose of practice.

1.02 Revision notice (if needed).

CAPACITY or FEATURES

1.03 Statements or table describing capacity, operating range, etc, of the set or station.

POWER REQUIREMENTS

1.04 Statement or table specifying current and voltage requirements.

DESCRIPTION

1.05 Brief description of the service provided by the set or station.

2. SUPPLEMENTARY INFORMATION

2.01 Listing of reference information associated with set or station.

3. DRAWINGS

3.01 Listing of schematics and product arrangement drawings.

4. PRODUCT**PRODUCT TYPE AND TITLE**

4.01 Listing of associated lists, list description, and special ordering information.

• **TABLE – AUTHORIZED ORDERABLE
CODE NUMBERS**

5. GENERAL NOTES**PRODUCT**

5.01 General notes concerning product.

WIRING

5.xx Notes

SCHEMATICS

5.xx Notes

• **LIST OF AUTHORIZED MFR. DISC.
PRODUCTS**

6. REASONS FOR REISSUE

6.01 Introduction.

6.02 Reasons for reissue.

4. TESTBOARD AND EQUIPMENT PRACTICES**GENERAL**

4.01 Testboards involved in the maintenance of data services include equipment such as the 904-type data test center (DTC), telegraph testboards, and automatic data test lines. Coverage for these types of equipment are provided in the 668 and 666 BSP divisions. The portable test equipment involved with data services is covered in the 103 and 107 BSP divisions.

4.02 Testboards normally require a Description and Operation practice (XXX-YYY-1ZZ), a Maintenance practice (XXX-YYY-3ZZ), and a Test practice (XXX-YYY-5ZZ). In addition, manned test positions require operating instruction practices

(normally XXX-YYY-5ZZ). In the case of the DTC, these practices are in the division-layer reserved for the DTC (668-YYY-ZZZ). Testing procedures from a private line test room are covered in 666-51Y-ZZZ. Operating instructions for telegraph testboards may be in the division-layer reserved for the testboard or in the division-layer reserved for the system or station being tested.

4.03 Coverage for portable test equipment is in the Description and Operation practice (103- or 107-YYY-1ZZ).

DESCRIPTION AND OPERATION PRACTICES

4.04 These practices provide the information and instructions required by telco employees responsible for operating and maintaining the test

position. They contain general information to familiarize the employee with the physical and functional characteristics and the general operating procedures for the equipment. This information permits the employee to apply the more detailed instructions contained in the other testboard practices effectively.

Contents

4.05 The information is normally presented in five parts: Part 1, General; Part 2, Physical Description; Part 3, Functional Description; Part 4, General Operating Instructions, and Part 5, References.

4.06 Part 1, GENERAL, contains the standard information (see 1.14) concerning the practice and introductory material which prepares the reader for the more detailed information that follows. This information provides a brief description of the purpose and function of the testboard and defines the application of the facility in terms of the environment in which it operates and the service it provides. Part 1 also contains statements defining any limitations or restrictions concerning the facility or its operation, and any necessary definitions or explanations of terms.

4.07 Part 2, PHYSICAL DESCRIPTION, should provide the maintenance employee with the details required for effective application of the removal, replacement, and repair instructions. Descriptive information should also be provided

that will enable the testboard operator to recognize and locate the controls, jacks, and other panel apparatus referenced in the operating instructions.

4.08 Part 3, FUNCTIONAL DESCRIPTION, must also be consistent with the maintenance and operation applications. The same general content requirements apply to testboards as apply to data apparatus (5.24) so far as maintenance considerations are concerned. In addition, information describing the interaction and sequence of use of components (controls, jacks, and other panel-mounted apparatus on the test position, as well as individual test sets) used for specific test procedures should be included.

4.09 Part 4, GENERAL OPERATING INSTRUCTIONS, should be limited to information concerning control panels, jack strips, etc, on the testboard. Operation of controls on test sets should be covered by a reference to the BSP for the test set. The operating instructions should be in procedural form with each procedure covering a specific operation. The procedures should include all operations which are performed the same way, regardless of the equipment being tested, and operations related to the test facility itself (self-testing operations, etc).

4.10 Part 5, REFERENCES, contains a list of BSPs, drawings, memos, etc, containing additional information concerning the facility. BSPs covering standard Bell System test sets and manufacturers' manuals for commercial test sets must be included.

TESTBOARD DESCRIPTION AND OPERATION TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 Purpose, function, and application of testboard. Identification of types of data apparatus that can be tested and the relationship of the testboard to the transmission and terminal facilities with which it is associated.

- 1.04 Limitations and restrictions of testboard.

2. PHYSICAL DESCRIPTION

- 2.01 Introduction. General physical characteristics of the testboard.
- 2.02 Arrangement and location of components. Illustrations and text describing the testboard and identifying the components.
- 2.03 *ABC Unit*: Illustrations and text describing a component of the testboard.

Note: A paragraph or paragraphs describing each component should follow.

- 2.xx Operating controls. Tables, illustrations, and text identifying controls, jacks, connectors, etc, that are used when operating the testboard. The description should include the location, purpose, and function of each item.

3. FUNCTIONAL DESCRIPTION

- 3.01 Introduction. Identification of the functional composition of the testboard (test sets, jack and control panels, and interconnecting wiring).

- 3.02 Block diagram description. Illustrations and text describing how each functional unit contributes to the overall function of the testboard. If both maintenance and operating considerations cannot be covered in a single description, a second set of illustrations and text should be provided to show the interaction and relationship of units in specific operational circumstances.

4. GENERAL OPERATING INSTRUCTIONS

- 4.01 Introduction. Identification of instructions which follow, and indications that specific instructions are in other practices.

- 4.02 Operation 1 (identity of instructions). What the procedure will accomplish.

STEP

PROCEDURE

1
2

- 4.03 Operation 2. Same format.

5. REFERENCES

- 5.01 List of documents with additional information.

MAINTENANCE PRACTICES

- 4.11 Maintenance practices provide the information and instructions required by the telco employees responsible for maintaining the testboard in proper operating condition. Information specifying the maintenance policy (repair-in-place or return

to a repair facility) is included, as well as the specific instructions for effecting repairs.

Contents

- 4.12 The information and instructions in this practice are generally contained in two parts: Part 1, General, and Part 2, Maintenance Procedures.

4.13 Part 1, GENERAL, contains the general information, recommendations, and instructions for establishing the maintenance program for the testboard. Component parts of the facility that should be returned for repair when repairs are necessary should be identified. Parts that may be repaired in accordance with instructions in other BSPs should be identified and the BSPs referenced. Other documents or maintenance aids should be listed and their uses indicated. Part 1 should also contain general precautions required during maintenance of the testboard.

4.14 Part 2, MAINTENANCE PROCEDURES, contains the specific instructions for maintenance activities. These instructions will vary according to the maintenance requirements for each testboard, but they should be consistent with the functions the maintenance personnel must perform. In general, procedures should be provided for removing and replacing the component parts of the board; for adjusting, aligning, or calibrating test sets or circuits; and when concerned with interacting components, for analyzing and isolating trouble to replaceable or repairable components.

TESTBOARD MAINTENANCE PRACTICE TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 Maintenance program. Statements recommending how the testboard should be maintained. Reference to tables identifying part to be repaired at a depot, in accordance with other BSPs, etc.
- 1.04 Maintenance aids. Statements or lists identifying information that may help in resolving maintenance problems.
- 1.05 Precautions. Indication of which procedures or activities must be considered during maintenance of the testboard.

2. MAINTENANCE PROCEDURES

- 2.01 Introduction. A note should be included indicating that the sequence of procedures does not specify the sequence of the overall maintenance activity.

REMOVAL AND REPLACEMENT PROCEDURES

- 2.02 *Unit 1*: Step-by-step instructions for removing and replacing the unit.
- 2.03 *Unit 2*: Same format.

ALIGNMENT PROCEDURES

- 2.04 *Unit 1*: Step-by-step instructions for aligning (adjusting or calibrating) the unit.
- 2.05 *Unit 2*: Same format.

TROUBLE ISOLATION PROCEDURES

- 2.06 Procedures and flowcharts specifying the sequence, decisions, and actions required to isolate trouble-causing components.

TEST PRACTICES

4.15 These practices contain the information and instructions required for testing the test facility and the circuits and test sets contained in the testboard. Procedures that may be used for routine testing to verify that the board is operating properly should be included when necessary, in addition to the trouble-isolating tests. The general requirements for the contents of test practices are similar those described in 5.70 through 5.82 for apparatus test practices.

Contents

4.16 The information in testboard Test practices may be presented in three parts: Part 1, General; Part 2, Routine Tests; and Part 3, Maintenance Tests.

4.17 Each part will contain essentially the same type of material as corresponding parts in the data apparatus Test practices (5.70 through 5.82).

TESTBOARD TEST PRACTICE
TYPICAL OUTLINE

1. GENERAL

1.01 Scope and purpose of practice.

1.02 Revision notice (if needed).

1.03 General instructions and precautions.
Statements providing information and instructions common to all tests. If applicable, include the list of test equipment and the remedial action required when a test fails.

2. ROUTINE TESTS

2.01 Introduction. Statements identifying the tests and the circumstances which control application of the test procedures (sequence of testing, etc.).

A. Test 1 (Title of test)

2.xx Purpose of test. Statement identifying what the test is expected to prove.

2.xx Test equipment required (if needed). List identifying the type of test equipment; identifying number; the term "or equivalent" if other models are acceptable; and if needed, the

application of the test equipment. For complex test hookups, a reference to a test connection diagram.

• Fig. — Test Connection Diagram (Test 1)

2.xx Test Procedure:

STEP	PROCEDURE
1	
2	

Requirement:

Remedial Action:

B. Test 2 (Title of test)

2.xx Same format as Test 1.

3. MAINTENANCE TESTS

3.01 Introduction

A. Test 1 (Title of test)

3.02 Same general format as Part 2.

OPERATING PRACTICES

4.18 Testboard and data test center operating practices provide the information required by the operator to remotely test data apparatus, stations, and systems, and to analyze troubles in the apparatus or connecting facilities. Two general types of operating practices can be identified. The data test center practices cover the test procedures required when testing from a 904-type DTC. Other practices describe the operations required when testing from a private line test room. Each practice contains a brief functional description of the apparatus, station, or system to be tested; a description of the built-in data set test features (if applicable) which may be used at the remote location; a discussion of the recommended policy for installing and maintaining the particular apparatus, station,

or system; and procedures for performing the tests. The test procedures also include the expected results and suggested remedial action for instances where the expected results are not obtained.

4.19 Testboard and DTC operators are expected to test data apparatus, stations, and systems upon installation and when trouble reports are received. In most cases, the operator will require the assistance of the installer or the customer to complete the tests. Each testboard serves a relatively large area, and the operator is the key individual in restoring service in the event of trouble, so the testing must be performed as efficiently as possible. The operators should be well trained in all aspects of data communications as well as in the operation of the test facility equipment. It is expected that the operator will

know the technical details of each data set, data auxiliary set, data station, data system, or data arrangement to be tested.

4.20 These practices supplement operator knowledge and training by providing the following:

- (a) Reminders concerning the data apparatus and the service it provides
- (b) The specific operating procedures for the testboard or test arrangement
- (c) A brief description of the actions required by the person at the remote test location
- (d) The requirements and remedial action for each test to be made
- (e) A description of the sequence of activities required for installation and/or maintenance of the service.

4.21 The operating procedures may be presented in two forms: specific, detailed step-by-step procedures for performing each operation, and abbreviated information an operator could not be expected to remember. The detailed procedures are to be used by relatively new operators or for seldom performed operations; the simplified procedures are to be used by experienced operators who are thoroughly familiar with the operation and purpose of the keys, cords, and test equipment in the test facility. Abbreviated procedures are used exclusively for test facilities using only standard test equipment that has detailed operating instructions in other BSPs. For test room procedures, where a number of arrangements are possible, simplified procedures are not used. The information in the practice and the knowledge of the operator should permit effective testing and trouble analysis for every type of data service. The operator has access to and should be familiar with the contents of the description and general operating procedures for the test facility. He should also be familiar with the responsibilities of the testboard as specified in the standard maintenance policy practices, which provide background information about the duties and responsibilities of the operator and define his actions in trouble investigations.

Contents

4.22 The information in the practice can be included in as many as six parts, if required: Part 1, General; Part 2, Description of Self-Test Features (where applicable); Part 3, Testing Policy; Part 4, Description of Tests and Equipment Arrangements; Part 5, Test Procedures; and Part 6, Simplified Test Procedures.

4.23 Part 1, GENERAL, contains, in addition to the general background information required by the operator, a very brief functional description of the apparatus to be tested. The description should be written in general terms, more as a reminder of the technical characteristics of the apparatus than as a complete technical description. Part 1 should also contain general instructions concerning the tests, such as any assistance required by the operator to make the test (telco employee or customer); information on the self-test features built into the data set so that the operator understands the extent of previous testing; any test equipment a telephone company employee requires for the tests; and a brief description of the circumstances which require or prohibit certain tests. The recommended methods for maintaining the service provided by the apparatus should also be described—whether the apparatus is to be replaced as a unit, or the circuit pack(s) causing the trouble are to be located and replaced. Other deviations from the standard maintenance policy should also be noted.

4.24 Part 2, DESCRIPTION OF SELF-TEST FEATURES, contains information on the self-test features built into the data set so the operator understands the extent of previous testing. This should be a functional description of what is accomplished (tested) by the self-test features. These are not test procedures but a functional description of test modes. If no significant self-test features are available, this part is omitted.

4.25 Part 3, TESTING POLICY, contains the recommended policy for maintaining the data service. This should include the sequence of activities (tests) to be performed to verify that the apparatus (equipment) is installed correctly. The maintenance test policy should include information on maintaining the service, ie, by replacement of cards or apparatus units, and the sequence of activities to be performed when a trouble is reported.

4.26 Part 4, DESCRIPTION OF TESTS AND EQUIPMENT ARRANGEMENTS, includes a brief description of each test to be performed and what is accomplished by the test. For test room procedures, where different arrangements are possible, a setup diagram should be included for each arrangement. The test equipment required and information on circumstances which require or prohibit certain tests should be included.

4.27 Part 5, TEST PROCEDURES, contains the specific detailed instructions for making the required measurements. This part should contain detailed procedures for performing each type of test.

4.28 The test is usually presented in a step-procedure format. Each step in the procedure should contain the instructions for one action or a short series of closely related actions. If the action in a step requires explanation or expansion, or if more detailed instructions are required, the additional material should follow the step in the form of a note.

4.29 Each complete series of actions ends with instructions either to read the value indicated by a meter or to observe an indication. The value of the meter reading or the indication which signifies a successful completion of the sequence follows the last step in the sequence under the heading **Requirements**. In cases where specific action is required to correct the trouble indicated by a test failure, the most probable remedies for the trouble condition will be listed under the heading **Remedial Action**. When the test results indicate that the apparatus being tested has failed and requires replacement, it should be specified that the test be rerun as required for an initial installation.

4.30 In most practices a logsheet for recording the test results will be recommended. The layout and content of this logsheet will be shown as an illustration following the test procedures. The illustration should be planned so that the telephone company can use it as a master to reproduce the logsheet.

4.31 Part 6, SIMPLIFIED TEST PROCEDURES, contains the abbreviated instructions for making the measurements required for the data set being tested. These simplified procedures are only required for step-procedures using standardized test equipment, eg, data test center operating procedures. This part must be organized exactly like the step-procedures, ie, the sequence of presentation, test titles, etc, must be identical in both parts.

4.32 Because the abbreviated instructions in this part are intended for experienced operators, the procedure may specify the function to be achieved rather than the specific operations required to achieve the function. These abbreviated procedures should begin on a new right-hand page, which can be removed from the BSP and placed in a notebook, if required. Any numerical values, ie, dial settings, meter readings, etc, associated with the procedure must always be included in the procedure.

4.33 The simplified test procedures should be presented in a simple procedure format to avoid confusion with the detailed procedures which are in step-procedure format. The simple procedure format provides a paragraph number and introductory statement for each step in the procedure.

TESTBOARD AND DATA TEST CENTER OPERATING PRACTICE TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Reasons for reissue (if needed).
- 1.03 Functional description of equipment. Identification and brief description of the unit to be tested.
- 1.04 General testing instructions. Information common to all tests and any other general information concerning the use of information in the practice.

2. DESCRIPTION OF SELF-TEST FEATURES (where applicable).

- 2.01 Functional description of self-test feature A (eg, analog loop).
- 2.02 Functional description of self-test feature B (eg, digital loop).

3. TESTING POLICY

- 3.01 *Installation Test Policy*: Description of policy recommended for installing the data service, using flowcharts as required.
- 3.02 *Maintenance Test Policy*: Description of policy recommended for maintenance and trouble isolation of the data service with flowcharts as required.

4. DESCRIPTION OF TESTS AND EQUIPMENT ARRANGEMENTS

(This part is not required for standard 904 DTC operating sections.)

- 4.01 Brief description of Test A including equipment required, functions to be tested and conditions under which the test is performed. (This information would be part of the introductory material in the Test Procedure part of a standard 904 DTC section.)

Fig. 1—Test Setup Diagram for Test A

(not required for standard 904 DTC section)

- 4.02 Same as 4.01 for Test B.

5. TEST PROCEDURES

- 5.01 Introduction to Test A.
STEP **PROCEDURE**
- 5.02 Introduction to Test B
STEP **PROCEDURE**

6. SIMPLIFIED TEST PROCEDURES

(This part is required for 904 DTC sections only.)

- 6.01 Introduction
- 6.02 Test A
(1)
(2)

Fig. —Sample logsheet at end of practice (if required)

PORTABLE TEST EQUIPMENT DESCRIPTION AND OPERATING PRACTICES

4.34 These practices provide the information and instructions which telco employees require to operate and maintain the test equipment. Two general types of portable test equipment are covered: equipment which may be used to perform a variety of tests on several types of data apparatus, station, or system (903-type, 914-type data test sets, etc); and specialized equipment which can be

used to perform a specific test or tests on data facilities or apparatus (26A data transmission test set, etc). Coverage for the two types is the same, except complete operating instructions are provided for the specialized test equipment. Specific operating instructions for general usage test equipment is included in the BSPs covering the equipment to be tested. The practice covering the general usage test equipment includes the operating instructions required to maintain and calibrate the test set.

Contents

4.35 The contents of the portable test equipment Description and Operating practices normally are presented in five parts: Part 1, General; Part 2, Physical Description; Part 3, Functional Description; Part 4, Maintenance and Test Procedures; and Part 5, Operating Procedures. The general requirements for the information in Parts 1 through 4 is essentially the same as corresponding information in the craft practices (5.01 through 5.86). The requirements for Part 5 are the same as the operating instructions for test facilities described in 4.18 through 4.33.

4.36 Part 1, GENERAL, contains the standard information concerning the practice and the introductory material which prepares the reader for the details that follow. This information describes in brief general terms what can be done with the test equipment, the equipment or facilities that can be tested, and the general principles and characteristics of the test equipment. Much of this information may be in the form of a table of specifications. Part 1 should also include any restrictions or limitations concerning the application of the test equipment.

4.37 Part 2, PHYSICAL DESCRIPTION, contains the description of the physical characteristics of the test equipment, keyed to the operating and maintenance requirements for the equipment. Illustrations and tables should be included to show the location and use of operating controls; the size and weight of the equipment; the location and identity of component parts (cords, connectors, adapters, etc); the location and identity of spare parts, test points, adjustable apparatus, replaceable parts, and other physical items related to maintenance.

Construction details and materials which have an effect on operating or maintenance activities should also be included.

4.38 Part 3, FUNCTIONAL DESCRIPTION, contains the necessary functional details to permit effective operation and maintenance of the equipment. Block diagrams and associated descriptions of each test circuit and the interconnecting control circuits should be included.

4.39 Part 4, MAINTENANCE AND TEST PROCEDURES, is used by the equipment operators in testing and maintaining the portable equipment. In most cases the equipment is repaired in a centralized facility, therefore field testing and maintenance are limited. The test procedures should be designed to prove that the equipment is properly calibrated and is working within its design tolerances. Maintenance activities will in most cases consist of recalibrating test circuits and replacing components such as fuses, lamps, and plug-in components.

4.40 Part 5, OPERATING INSTRUCTIONS, contains the step-by-step procedures for using the test equipment. For specialized test equipment (eg, data transmission test sets) this includes procedures for testing the transmission facilities, equipment, or apparatus, as well as for self-testing the test equipment. For general purpose test equipment (eg, 914-type data test set) the operating instructions consist of self-testing procedures and general operating instructions that are common to all testing. For example, if the method for measuring the output level is the same for all data sets, this procedure should be included and referenced in the data set test practices.

PORTABLE TEST EQUIPMENT DESCRIPTION AND OPERATING PRACTICE TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 Purpose and function of test equipment. Statements identifying what can be done with the test equipment and the general principles behind the test circuits.
- 1.04 Characteristics and specifications. Tables and lists of the ranges, tolerances, and accuracy of the test circuits. Also power requirements, etc.

2. PHYSICAL DESCRIPTION

- 2.01 Introduction. Statements identifying the principal physical components of the test equipment.
- 2.02 Location and purpose of operating controls. Illustrations and tables identifying each operating control, showing the location of the control and specifying its use.
- 2.xx Physical characteristics. Illustrations and tables showing the location of items in the test equipment, the size and weight of the equipment (and major components, if necessary), and replaceable parts or other maintenance-related items.
- 2.xx Construction details. If necessary, statements and illustrations identifying construction techniques and materials which affect operation or maintenance activities.

3. FUNCTIONAL DESCRIPTION

- 3.01 Introduction. Statements identifying the major functional components of the test equipment.

- 3.02 Circuit description. Block diagrams and text describing the function and relationships of the components in each test circuit.

4. MAINTENANCE AND TEST PROCEDURES

- 4.01 Introduction.
- 4.02 Replacement procedures. Step-by-step procedures for removing defective parts (fuses, lamps, etc) and installing good parts.
- 4.03 Calibration procedures. Step-by-step procedures for adjusting, aligning, or otherwise calibrating test circuits.
- 4.04 Test procedures. Step-by-step instructions for connecting test equipment or apparatus to the test equipment being maintained, adjusting controls and measuring values to determine that the equipment being checked is operating properly. (Self-test procedures using only the panel controls are included in Part 5 and may be referenced if necessary.)

Note: All procedures should be preceded with a descriptive title such as FUSE REPLACEMENT PROCEDURE or VTVM CIRCUIT CALIBRATING PROCEDURES.

5. OPERATING INSTRUCTIONS

- 5.01 Introduction.
- 5.02 Operating procedures. Step-by-step instructions for each function that can be performed with the test equipment, including each test that can be made and each self-test procedure. Each procedure should be preceded by a descriptive title.

5. CRAFT PRACTICES

GENERAL

- 5.01 Craft practices provide the information and instructions required for normal installation

and maintenance activities by the telco craft forces. Generally, five practices are involved with key numbers as follows: Identification or Description (-100), Installation and Connections (-200), Maintenance (-300), Wiring Information (-400), and Tests (-500). If operating instructions are included, the descriptive

practice becomes Description and Operation. Each type of practice serves a distinct and individual purpose in providing the craft employee with the information he requires.

5.02 The Description practice explains the physical, functional, and operational characteristics of the apparatus to the depth necessary to ensure that the employee understands the peculiarities and complexities of the installation and maintenance operations. The depth of coverage required is related to the design of the apparatus. For example, some apparatus may be composed of one or two large-scale integrated circuit chips. It is not necessary to include detail as to the functional characteristics of individual circuits included in the chips, since no maintenance can be performed on these circuits. A thorough understanding of the information in the Description practice enables the employee to apply the information and instructions in the other practices efficiently.

5.03 The Installation and Connections practice contains specific instructions for physical and electrical installation of the apparatus. Special considerations and precautions which could affect the installation are included. Optional arrangements of the apparatus and connections to auxiliary apparatus are covered, as well as specific instructions for wiring in optional features.

5.04 The Maintenance practice provides the information required for mechanical and electrical repairs on the apparatus. This includes information on gaining access to specific areas where maintenance activities are required, use of special tools, and other maintenance aids. For certain apparatus requiring little maintenance, this section may not be required; the test section can describe all test and maintenance activities.

5.05 The Wiring Information practice provides the information required by maintenance personnel to locate and replace defective wiring or small components (relays, filters, switches, etc) that are maintained on the chassis or similar parts (KTUs, transformers, etc) associated with the installation.

5.06 The Test practice contains step-by-step instructions for on-site activities necessary to test the apparatus with self-test features, portable test equipment, or with the data test center. The results should include indications of successful

completion of the test, and remedial actions to correct a trouble cause if the test fails are also included.

5.07 Installation and maintenance information for facilities, selected data apparatus, and stations is also provided in handbook form. This Data Services Manual is intended for the more experienced telco employee and covers only the more common applications of the apparatus and stations.

5.08 Craft practices are used by the telephone company installation and maintenance personnel assigned to data apparatus, whose qualifications may vary widely. Some of them may be specialists, well trained and experienced in installation and maintenance of data and similar electronic apparatus. Others may normally be concerned with installation and maintenance of telephone sets or similar apparatus and only occasionally will be assigned to work with data apparatus. It should be recognized that the complexity of some apparatus will require either the services of other than the typical craft employee or extremely detailed BSP coverage. In these cases the level to which the BSPs are written should be negotiated.

5.09 The craft employee is required to install and maintain all types of data apparatus with normal supervision and assistance from management and engineering personnel. The majority of the information and instructions the employee receives comes from the BSPs. It is necessary, therefore, that the practices be carefully designed so that the employee can get this information and instruction as easily as possible. The technical content must be kept within the employee's limits of comprehension and limited to what is needed for effective performance. If the employee's assignment does not require detailed knowledge of the functions of individual circuits, the apparatus should be described in general terms, ie, each overall function of the apparatus should be described emphasizing its effect on the service provided by the apparatus. If more detailed knowledge is required, each overall function should be broken down into subordinate functions which contribute significantly to the overall function. In any case, the description should start with facts which are well understood by both reader and writer. Each new fact or concept that is introduced is based on and developed from the previously known facts.

5.10 Complex operations should be broken down into understandable steps and adequately explained. This ensures that the employee will understand the complexity of the operation and will be capable of completing it successfully.

5.11 The terminology used in the practices must be consistent with the experience of the employee. New terms should be explained or avoided. Terms which are commonly used in engineering documents or by AT&T and BTL are not necessarily known to craft employees. The context in which common terms are used must also be considered. A precise, technically correct usage can occasionally cause more confusion than a less precise generality; eg, an amplifier with an external feedback circuit which causes a predictable instability of operation should be called an oscillator.

5.12 The writing and editing styles must also be consistent with employee experience. Sentence structure and grammatical usage should be kept to a level that can be understood by a high school graduate. The practices should be as concise as possible, consistent with thorough coverage of the subject.

DESCRIPTION PRACTICES

A. Data Apparatus

5.13 Data apparatus can be described in one of two types of descriptive practices, an Identification practice or a Description and Operation practice. Identification practices are primarily used to list references to other practices containing details about the apparatus covered, while the Description and Operation practices contain all required details.

Identification Practices

5.14 In many instances, craft practices are written about combinations of data apparatus. In these cases, details concerning subordinate apparatus are included in practices which are identified, by number and title, with the primary apparatus. Under these circumstances, it is necessary to provide Identification practices (590-102-1ZZ) covering the subordinate apparatus. The practice is included in the division-layer reserved for the type of apparatus involved. This provides an entry in the BSP index, giving the craft employees a starting point for locating the information covering the apparatus.

The information is intended to *identify* the apparatus in terms of its use and primary functions. It provides the craft employee with elementary knowledge concerning the apparatus.

5.15 Apparatus which may require Identification practices include the following:

- (a) Data sets which are a part of a data station
- (b) Data auxiliary sets which are a part of a data station or which are designed to be used with only one data set
- (c) Data units and data mountings which contain active components, connectors, option connections, etc.

Contents

5.16 An Identification practice normally contains a front, three-quarter view, half-tone illustration of the apparatus, a brief physical and functional description, an explanation of how the apparatus is used, and a list of BSPs which contain the details concerning the apparatus. The information is usually presented in three parts: Part 1, General; Part 2, Description; and Part 3, References.

5.17 Part 1, GENERAL, contains, in addition to the standard information concerning the practice, statements concerning the purpose and function of the apparatus. This information states in general terms the overall contribution of the apparatus to the service provided by the system or station.

5.18 Part 2, DESCRIPTION, contains the physical and functional description of the apparatus and a brief explanation of its application.

- (a) The physical description is limited to overall dimensions and weight and mechanical characteristics (material, method of installation or mounting, etc).
- (b) The functional description is very general; primarily statements of the basic functions of the apparatus in terms of inputs and outputs.
- (c) The application information is limited to the identification of the system or station in which the apparatus is used and a definition of the service provided by the system or station.

5.19 Part 3, REFERENCES, consists of a listing or identification (division-layer BSP numbers and system or station involved) of the practices containing the detailed information. The list should be preceded by a suitable introductory statement.

If the apparatus is designed to be used in more than one system or station, each set of practices containing information concerning the apparatus must be listed.

DATA APPARATUS IDENTIFICATION PRACTICE
TYPICAL OUTLINE

1. GENERAL	2. DESCRIPTION
1.01 Scope and purpose of practice.	2.01 Introduction (applicable of the apparatus).
1.02 Revision notice (if needed).	2.02 Physical description.
1.03 Purpose and function of apparatus.	2.03 Functional description (if applicable).
3. REFERENCES	
3.01 Introduction. List of applicable BSPs.	

Fig. 1 — Front Three-Quarter View of Apparatus (Half-Tone)

Description and Operation Practices

5.20 These practices (59X-YYY-1ZZ) provide the craft employee with the basic information required to use the instructions contained in the Installation and Maintenance practices effectively. Description and Operation practices are intended to be used by the employee *prior to an installation or maintenance visit*, to become familiar with the technical and physical details of the apparatus. They are also used as reference material to support the installation, maintenance, and test practices. The term Operation in the title refers to functions that are required of or that can be performed by an operator. If no manual operation is possible, operation information is not included. Because the Description and Operation practices are descriptive material, they are also used in classrooms as reference texts and by telephone company management personnel to gain an appreciation of the features and capabilities of the apparatus. Use of the practices in classrooms or for appreciation purposes, however, is secondary and usually does not influence decisions concerning the contents.

5.21 Because the Description or Description and Operation practice is one of a series of practices covering a unit, it must be compatible in content and depth of coverage with the other practices in the series. The installation and maintenance requirements for the apparatus must be considered during the preparation of the practices.

Contents

5.22 Description and Operation practices normally have the information divided into five parts: Part 1, General; Part 2, Physical Description; Part 3, Functional Description; Part 4, Operation (if applicable); and Part 5, References.

5.23 Part 1, GENERAL, contains the standard information concerning the practice (scope and purpose of the practice, and if necessary, the revision paragraph) and general, introductory information which prepares the reader for the specific information in the following parts. The introductory material should describe the basic purpose and function of the apparatus being covered and should define the application of the apparatus in terms of the environment in which it functions; ie, define the service provided in generic terms and describe, also generically, the equipment and facilities which complete the system. The permissible configurations in which the apparatus may be used should be identified. The permissible operating modes, other apparatus that may be used, and the types of facilities (transmission, test, etc) that are required should be mentioned. Part 1 should also contain the definition or explanation of terms or abbreviations used in subsequent parts, eg, "Terminal equipment may be either telco-provided or customer-provided equipment (CPE)."

5.24 Part 2, PHYSICAL DESCRIPTION, provides the craft employee with the details required to become familiar with the physical characteristics of the apparatus. The physical description provides mechanical information such as dimensions, weight, method of construction, and materials used in the apparatus. The physical arrangement is also described in terms of the location of controls, connectors, components, etc. Details such as size, weight, and materials used suggest to the employee how the apparatus must be handled to minimize the possibility of damage. Illustrations showing the physical appearance of the apparatus permit him to recognize controls, components, etc., more readily on maintenance visits. The physical description should reflect the maintenance policy and installation requirements for the apparatus being covered. Description of internal features and identification of internal components will not be required unless the apparatus is to be maintained by replacing defective internal components. However, the location of option switches or wiring points required for connecting option straps or other wiring must be shown and described.

5.25 Part 3, FUNCTIONAL DESCRIPTION, describes the functional characteristics of the apparatus. The block diagram description explains how the apparatus accomplishes its purpose. This information is an expansion of the functional information in Part 1, which defines the location of the apparatus in an overall system and describes the general purpose and function of the apparatus. The information in Part 3 begins at this point and continues to the depth required by the maintenance policy for the apparatus.

(a) In order to support the maintenance activities, the apparatus should be covered to one level of detail (generation) beyond the components to be replaced during maintenance activities; ie, if the entire apparatus is to be replaced to restore service, a second generation (simplified) block diagram description of the apparatus is required (see Fig. 2). If circuit packs are to be replaced, a detailed block diagram (see Fig. 3) description is required. The functional description should explain the purpose of each major functional circuit, and show the relationship and interaction of the circuits to each other and to the system.

(b) It is particularly important to keep the functional description simple and concise. Unusual terminology or terms used in an

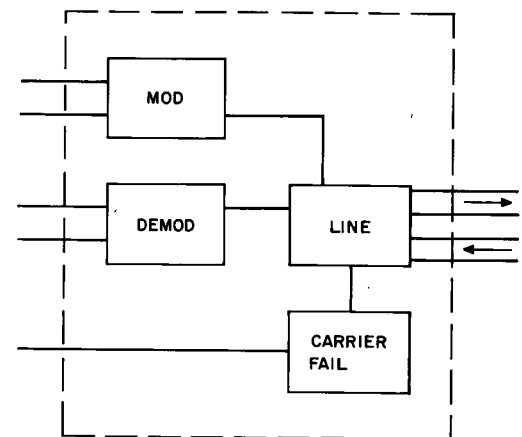
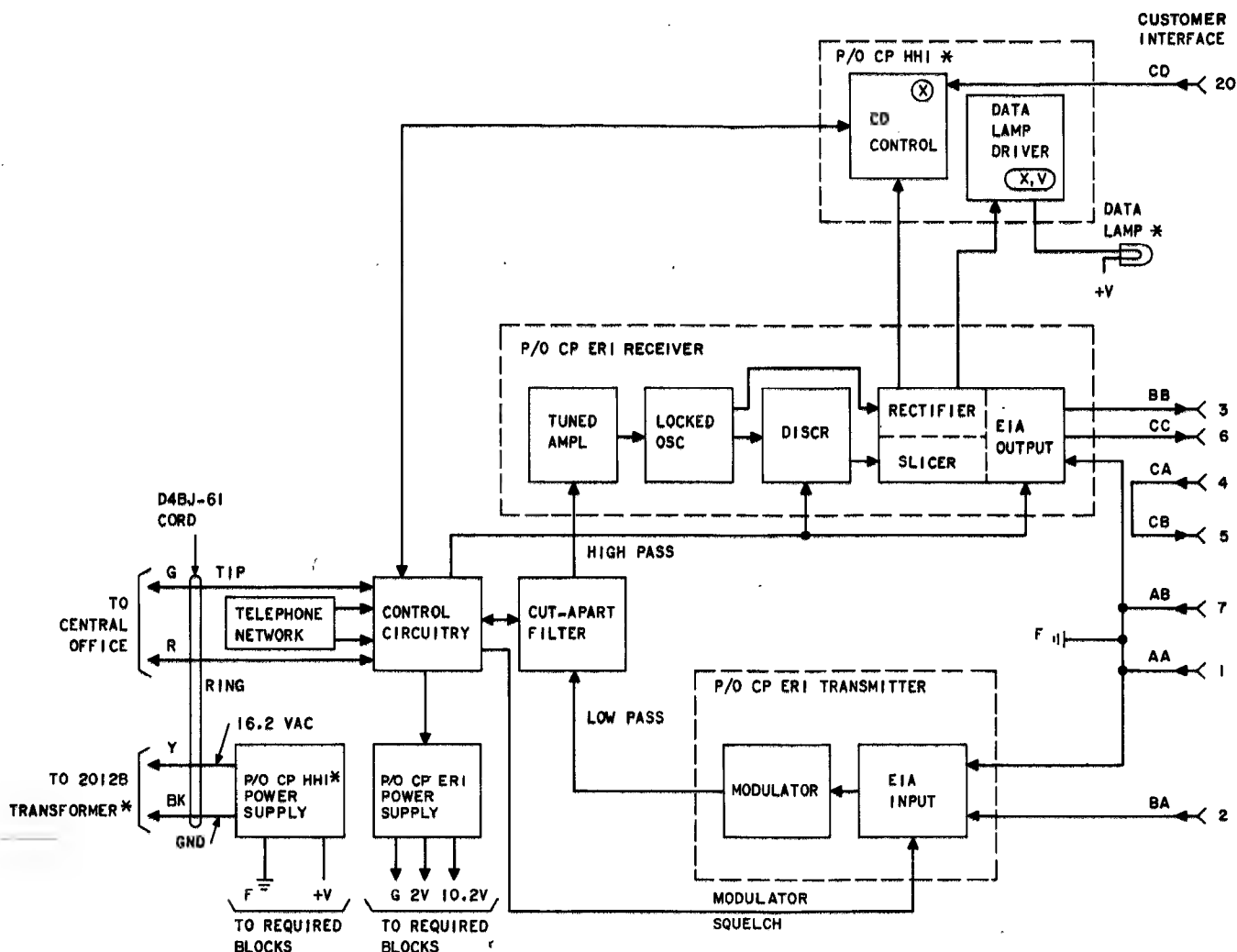


Fig. 2—Example of Second-Generation Block Diagram

uncommon way must be thoroughly explained or preferably avoided.

5.26 The functional characteristics of the apparatus should be defined in a series of tables and diagrams. These include the following:

- **Customer Options:** A list of the optional features the customer may select. Each option should be identified by noun nomenclature, eg, "Permanent Auto Answer"; by SD designation, eg, "Z"; with a brief statement describing the function of the option; and with any restrictions or limitations, eg, "Must be installed when 801A is used."
- **Telco Options:** Same type of information as for customer options. For options that are common to many data sets, eg, power level setting or terminal impedance, the description may be omitted.
- **Interface Signals:** A list of the signals exchanged with the terminal equipment showing the identification, function, source, and sequence. If discrepancies between the SD and EIA terminology exist, the terms should be related. Where the sequence and relationship of the signals are complex, a timing diagram should be included in addition to the tabular list.
- **Line Signals:** A description of the line signals showing the frequency or amplitude that characterizes each identifiable signal,



* THE HHI CIRCUIT PACK, DATA LAMP, AND 2012B TRANSFORMER ARE USED ONLY WHEN OPTION V OR X IS INSTALLED IN THE DATA SET 113A-L1/2 OR 113A-L1A/2.

Fig. 3—Example of Detailed Block Diagram

eg, a 2025-Hz MARK signal or a 8-mA MARK signal; the relationship of the signals to the operating mode of the apparatus, eg, MARK when data set is in originate mode; sequence of signals, eg, the handshaking sequence (or reference to diagram showing sequence); and other pertinent characteristics.

5.27 Other similar functional characteristics such as a description of the data set/telephone interface should be included when required. The characteristics should be included in tabular form or in diagrams when possible.

5.28 Part 4, OPERATION (if required), consists of instructions to the craft employee for operating the apparatus. Simple instructions (one or two operations) can be presented in narrative form. These instructions should provide enough information so the craft employee can perform the operation in testing, and to demonstrate the operation to the customer. If no operator control is possible, this part should be omitted.

5.29 Part 5, REFERENCES, consists of a list of related practices which provide additional or supplementary information concerning the apparatus. Normally, practices in the same series

will not be included nor will general information practices. Practices covering the use of the apparatus in stations or systems should be included. If general information practices are included, they

should be identified as general background information rather than specific application information.

DATA APPARATUS DESCRIPTION PRACTICE TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 Purpose and function of apparatus. Statements identifying the service or system in which the apparatus is included — what and how the apparatus contributes to the service or system, in very general terms.
- 1.xx Permissible configurations. Various permissible operating modes, other apparatus that may be used, and the types of facilities (transmission, test, etc) used.

2. PHYSICAL DESCRIPTION

- 2.01 Introduction. General physical characteristics of the apparatus.
- 2.02 List of parts comprising the apparatus.
- 2.03 Location of connectors, controls, etc.
 - Fig. — Location of Connectors, Controls, etc.
- 2.04 (if needed) Location of internal components

Fig. — Location of Internal Components

3. FUNCTIONAL DESCRIPTION

- 3.01 Introduction. Functional composition of apparatus — expansion of 1.03 (purpose and function of apparatus).
- 3.02 Block diagram description. General description of how each functional component contributes to the overall apparatus function, covering all permissible configurations.

• Fig. — Functional Block Diagram

- 3.xx Functional characteristics.

- TABLE — CUSTOMER AND TELCO OPTIONS
- TABLE — INTERFACE SIGNALS
- TABLE — LINE SIGNALS
- TABLE — MAINTENANCE AND TEST FEATURES

4. OPERATION (if applicable)

- 4.01 Introduction. Sequence of manual operation to be performed in operating the equipment (eg, establish voice and/or data call, test mode, etc.).

5. REFERENCES

- 5.01 List of sources for additional information.

B. Data Stations

5.30 Description and Operation practices for data stations (59X-8YY-1ZZ) are prepared when two or more units of data apparatus are connected in arrangements that require overall instructions for installation, maintenance, or testing of the units. Two basic categories of station arrangements are involved.

- (a) Stations composed entirely of specially designed units or of common purpose units used in a

nonstandard manner, such as for a customer-provided terminal. Another example would be a station controller, a data set in a data mounting, and a separate attendant set, all specially designed to work together; or the same arrangement with a common-purpose data set that operates differently in this arrangement than in its standard arrangement.

Note: An arrangement consisting of a data set and a separately housed attendant set

designed to work together should be covered as a single unit in the data set practice.

- (b) Stations composed of combinations of special and common-purpose data apparatus interacting in a unique manner. An example would be several standard data sets mounted in special data mountings which may be controlled by an attendant set.

Note: An arrangement consisting of a standard data set, attendant set, and an automatic calling unit can be installed, maintained, and

tested as separate units, and therefore does not require a station descriptive practice.

Contents

5.31 Station Description and Operation practices contain essentially the same parts and information as apparatus Description and Operation practices. The basic difference is that for the all-special-units arrangement, a block diagram description for all components is provided. In the combination arrangement, the component block diagram description is omitted for common-use apparatus if it is covered in apparatus Description and Operation practices.

DATA STATION DESCRIPTION PRACTICE TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 Purpose and function of station. Identification of the system and/or the service the station is used in, what the station contributes to the system, and features provided by the station. General statements specifying how the station provides the features and services.
- 1.xx Permissible configurations. Statements or table listing operating modes, optional apparatus that may be included, and the various arrangements of apparatus that are permitted.

2. PHYSICAL DESCRIPTION

- 2.01 Introduction. General physical characteristics of the station.
- 2.02 List of components for the various arrangements.
- 2.xx Location of connectors, controls, etc.
- Fig. — Location of Connectors, Controls, etc
- 2.xx (if needed) Location of internal components.
- Fig. — Location of Internal Components

3. FUNCTIONAL DESCRIPTION

- 3.01 Introduction. Functional composition of the station (major units).
- 3.xx Block diagram description. General description of how each major unit contributes to the functions of the station.
- 3.xx Component block diagram. Descriptions of how each major functional part of the component contributes to the function of the component. Omitted if components of the station are common-use apparatus units covered in separate apparatus description practices.
- 3.xx Functional characteristics.
- TABLE — OPTIONS
 - TABLE — INTERFACE SIGNALS
 - TABLE — LINE SIGNALS
 - TABLE — DESCRIPTION AND SEQUENCE OF SIGNALS BETWEEN MAJOR UNITS
- 3.xx Maintenance and test features. Description of circuits and features that assist in testing and troubleshooting, and identifying central test boards, etc, that may be used to remotely test the station.

4. REFERENCES

- 4.01 List of sources of additional information.

C. Data Systems

5.32 System Description practices are prepared when the arrangement of system components (stations, test facilities, transmission facilities, etc) is relatively complex, ie, more complex than 2-point private line or standard switched network Dataphone services; or when two or more stations interact in a relatively complex manner, ie, more complex than returning an automatic answer tone in Dataphone service or the normal handshaking sequence in some private line data sets. In most cases, the complex arrangement or the complex interaction requires system-oriented maintenance activities. The description practice must support and be keyed to the maintenance effort.

Contents

5.33 System Description practices normally have the information divided into four parts: Part 1, General; Part 2, Functional Description; Part 3, Maintenance Facilities; and Part 4, References.

5.34 Part 1, GENERAL, contains the standard information concerning the practice (scope and purpose of the practice, and if necessary, the revision paragraph) and general introductory information which prepares the reader for the specific information in the later parts. The introductory material should describe the basic purpose and function of the system in terms of the service provided by the system. The functional restrictions and requirements for the system should

be identified (facilities and functions required, both Telco and customer-provided, and system specifications) and the permissible operating modes or arrangements for the system described.

5.35 Part 2, FUNCTIONAL DESCRIPTION, contains information which identifies each functional component of the system and describes the relationship and interaction of the components on a block diagram basis. Each arrangement of the system that is permitted must be covered. Tables, charts, and lists of the functional characteristics of the system are provided. This includes system-oriented options, station-to-station signals and responses, etc. The functional description provides the information required to apply the maintenance procedures for the system effectively and provides a basis for the more detailed information that is contained in the station and apparatus practices covering these system components.

5.36 Part 3, MAINTENANCE FACILITIES, contains brief descriptions of system components (circuits, apparatus, test positions, etc) that are provided to assist in locating malfunctioning system components. Each configuration or arrangement of the system must be covered.

5.37 Part 4, REFERENCES, contains a list of the other practices (service, station, or apparatus) with information pertinent to the system. Other documents, SDs, CDs, ELs, etc, may also be referenced.

DATA SYSTEM DESCRIPTION PRACTICE TYPICAL OUTLINE

1. GENERAL

1.01 Scope and purpose of practice.

1.02 Revision notice (if needed).

1.03 Purpose and function of the system. Identification of the general service and features provided by the system, and in general terms, how the system provides the service features.

1.xx Restrictions and requirements. Statements identifying telco facilities required by the system; customer facilities or functions required; statements or table listing system specifications (error rate, data transmission speed, number of channels, etc).

1.xx Permissible configurations. Statements or table listing operating modes and arrangements.

2. FUNCTIONAL DESCRIPTION

2.01 Functional composition of the system.

2.xx Block diagram description. Statements showing how each functional component contributes to the overall system functions.

Fig. — System Block Diagram

2.xx Statement, table, or chart showing *station* interactions, ie, signals and responses.

3. MAINTENANCE FACILITIES

3.01 Circuits, apparatus, etc, required for maintenance of the system.

3.02 Brief functional description of the maintenance circuits, apparatus, etc.

3.xx Statements (if necessary) identifying additions to or exceptions for 3.01 if certain configurations are used.

4. REFERENCES

4.01 List of sources for additional information.

D. Data Services

5.38 A Description practice for data services is prepared when necessary to cover two or more systems, stations, or apparatus units that are used to provide a definable category or class of data transmission. This practice permits telco employees to identify and recognize the similarities among the various arrangements that provide the same basic service. The features, advantages, and disadvantages of each arrangement are described so that the best arrangement can be specified for each specific customer need.

Contents

5.39 The information in the practice is divided into four parts: Part 1, General; Part 2, Functional Description; Part 3, Catalog of Systems; and Part 4, References.

5.40 Part 1, GENERAL, in addition to the standard information about the practice, contains brief

statements identifying the purpose of the service, ie, what type of data transmission the service will provide for the customer, and the service restrictions and requirements. The restrictions and requirements should identify facilities and functions (both telco and customer-provided) needed to implement the service and should also indicate what the service is *not* expected to provide.

5.41 Part 2, FUNCTIONAL DESCRIPTION, describes the basic type of data transmission provided by the service, the added features and functions provided by the various arrangements involved, and the service specifications (data exchange rate, error rate, terminal or interface requirements, etc). Part 2 information also provides a basis for the system, station, and apparatus practices covering the arrangements which provide the service involved.

5.42 Part 3, CATALOG OF SYSTEMS, lists arrangements (systems, stations, or apparatus) which may be used to provide the basic service. When necessary, the added features or functions

provided by the various arrangements may also be included.

and other documents that provide additional information concerning the service.

5.43 Part 4, REFERENCES, contains a list of system, station, and apparatus practices,

DATA SERVICE DESCRIPTION PRACTICE TYPICAL OUTLINE

- | | |
|--|---|
| <p>1. GENERAL</p> <p>1.01 Scope and purpose of practice.</p> <p>1.02 Revision notice (if needed).</p> <p>1.03 Purpose of service; what the service will do for the customer.</p> <p>1.xx Restrictions and requirements. Statements identifying Telco system facilities required to provide the service; also any restrictions or constraints concerning the service.</p> <p>2. FUNCTIONAL DESCRIPTION</p> <p>2.01 General description of basic service.</p> | <p>2.xx General description of features provided by various systems providing the basic service.</p> <p>2.xx General description of customer- and Telco-related service specifications, maintenance considerations, effects of transmission impairments, test facilities required, etc.</p> <p>3. CATALOG OF SYSTEMS</p> <p>3.01 List of systems providing the basic service; identifying features, etc.</p> <p>4. REFERENCES</p> <p>4.01 List of sources for additional information.</p> |
|--|---|

INSTALLATION AND CONNECTIONS PRACTICES

5.44 Installation and Connections practices (59X-YYY-2ZZ for data apparatus and 59X-8YY-2ZZ for data stations) provide specific, detailed instructions for internal optional wiring connections, for connection of the apparatus to other equipment, apparatus, or facilities; and for mechanical installation of the apparatus. The instructions should permit the average craft employee to install and connect the apparatus quickly and accurately.

5.45 The instructions are presented in step-by-step procedures and in illustrations to minimize the possibility of misinterpreting the thoughts and intentions of the writer. The contents are based on the assumption that the employee has been properly prepared (has read and understood descriptive information on the apparatus, the general installation practices, and other applicable general information practices), properly equipped (provided with the tools and test apparatus required for the installation), and properly trained (knows how to use the tools and test apparatus and knows the standard techniques required for installing data

apparatus). It is also assumed that the other organizations and individuals in the telephone company have done their jobs properly (ie, the installation has been properly designed to be compatible with the terminal equipment and the telephone facilities and that all of the required apparatus has been ordered and options have been specified). Based on these assumptions, the installation practice contents can be limited to the instructions necessary for installing the apparatus.

Contents

5.46 The contents of Installation and Connections practices is normally in five parts: Part 1, General; Part 2, Tools and Apparatus; Part 3, Option Connections; Part 4, Installation and Connection Procedures; and Part 5, Post-Installation Test Requirements.

5.47 Part 1, GENERAL, contains the standard information concerning the practice and any other information of a general nature that applies to the apparatus being covered. Limitations in the coverage should be identified when necessary. Instructions and information which are common to

all data apparatus are covered by a reference to the general installation practices (Section 590-010-200 and 590-010-201). Precautions, such as not using extension telephones on the data line, measuring and eliminating potential differences between business machine and data set grounds, and methods which apply only to the apparatus involved should be explained in this part.

5.48 Part 2, TOOLS AND APPARATUS, identifies the special tools required for installing the apparatus. Tools which are normally carried by the employee (screwdrivers, pliers, etc) should not be included. This information should be in the form of a list, with a brief introductory sentence, which identifies each tool or piece of apparatus by generic name (wire-wrap tool, etc) and the Bell System code or other precise identifying number. When any of a class of tools can be used, one of the class should be identified with the phrase "or equivalent" added to the identifying number.

5.49 When special tools are not required, a statement to that effect should be included at the end of Part 1 and this part omitted.

5.50 The information in Parts 3, 4, and 5 should be arranged for maximum utility. For example, if several configurations are covered which require essentially different instructions, all the installation procedures should be grouped under part headings that identify the configuration, with subpart headings to identify installation functions. However, if the instructions or major parts of the instructions are identical, the information should be in parts which identify the installation function with subparts when necessary to identify the different configurations. The contents of these parts (or subparts) is described in the following paragraphs as separate parts only.

5.51 Part 3, OPTION CONNECTIONS, contains the specific instructions required to install and remove each optional feature or circuit designed into the apparatus as installer options. These instructions should be in tabular form, if possible. In the instances where the instructions are too complex to be presented in tabular form, text and step-by-step procedures should be used. In either case the connection information must identify the option (letter designation, noun nomenclature, or other designation used in Reference Guides, engineering BSPs, etc), the mutually inclusive or exclusive options, and the specific connection or

connections which must be made to install the option. Option tables should be constructed so as to make it clear if options are mutually inclusive or exclusive. For some telco options, such as line buildout or output power level, which are related to the type of loop being used and may require measurements at time of installation, adequate information should be provided so the proper option can be selected, based on the results of the measurements. Two general classes of options (so far as connecting instructions are concerned) must be recognized. One type, a mutually exclusive option that is installed automatically when its counterpart is removed, may be identified by instructions to "tape and store" or "store on terminal X" (a blank terminal). The other type, mutually exclusive options which share a common connection at the fixed end of the strap, may be identified by the instructions, "Move strap from terminal 1 to terminal 2." To avoid possible confusion, the two types must be distinctly covered. Notes appended to the table or text preceding the table should identify the options in the two classes, and in general terms, describe how each is to be installed. Instructions for gaining access to terminal boards, etc, should be included.

5.52 Part 4, INSTALLATION AND CONNECTION PROCEDURES, contains the specific instructions for mechanical and electrical installation of the apparatus. These instructions should be presented in step-by-step procedures and in drawings when possible. Text should be kept to a minimum and limited to only that which is necessary to introduce and explain the procedures and drawings. This information may be presented in two parts if necessitated by long, complex, installation and connection procedures. The mechanical installation information must be compatible with the complexity of the installation. In most cases, a single sentence, "The data set may be placed on any convenient desk or table within range of the business machine interface cord," will be adequate. More complex installations (multiple station arrangements, etc) may require more extensive instructions. The following information should be included as required by complexity of the apparatus or station.

- (a) List of Parts—a list of all parts and apparatus required for the installation. The list should identify the part or apparatus by name, code or part number, and application.

(b) **Assembly Drawings**—drawings which show the location and method of assembly for each part or apparatus involved. Several levels of detail, including exploded views, may be necessary to properly illustrate the assembly procedures.

(c) **Floor Plan Drawings**—drawings which show the relative position of cabinets, racks, etc, that make up the installation. These drawings may also be used to show the direction of growth if additions become necessary and the location of the installation with respect to walls or other obstructions to allow for proper operating and maintenance floor space. Dimensions on such drawings should not use tolerances closer than necessary or decimals.

(d) **Assembly Procedures**—step-by-step instructions specifying the sequence and operations necessary for proper assembly. Special instructions, such as cabinet leveling or ground strap bonding, should be included in the form of a note or a READ when required.

The electrical installation information includes drawings and procedures specifying the connections between the apparatus and the business machine, the telephone facilities, and any auxiliary parts or apparatus required for the installation. When the

interconnections involve only plug-ended cables, a cabling diagram may be used. When terminal strips, etc, are used, a full wiring diagram should be used. Interconnections of KTUs or similar apparatus may be shown with wiring lists or tables.

5.53 Electrical installation also includes procedures, tables, and drawings specifying methods and requirements for adjusting or aligning units or strapping pads, etc, so the apparatus will work properly in its installed environment. Methods for determining that an adjustment is necessary (ie, instructions for connecting test equipment, setting controls, etc, to make a measurement) would normally be included in the test (-500) practices for the apparatus or station, but may be included in these instructions in some cases.

5.54 Part 5, POST-INSTALLATION TEST REQUIREMENTS, is a list identifying the tests which must be performed to ensure that installation has been done correctly. Procedures for instructing the craft employee how to perform the tests (if required) are in the test practice associated with the apparatus. When specific test procedures are not necessary, eg, testing done by the data test center, or when the test consists of exchanging data with another station, a statement specifying the test required and limited instructions is adequate.

INSTALLATION AND CONNECTIONS PRACTICE TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 Limitations in coverage.
- 1.xx References to standard installation practices.
- 1.xx General precautions and installation information.

4.xx Parts (apparatus) required for installation.
List of apparatus and piece parts.

4.xx Assembly procedures. References to floor plan and assembly drawings and procedures for mechanical assembly of racks, mountings, etc. including leveling, bracing, and grounding methods.

- Fig. — Floor Plan for _____
- Fig. — Assembly of _____

2. TOOLS AND APPARATUS

- 2.01 Introduction. References to tables and lists identifying tools and apparatus required for installation.

- TABLE — INSTALLATION TOOLS

3. OPTION CONNECTIONS

- 3.01 Introduction. References to procedures, illustrations, and tables (as required) specifying how to install the options.

- 3.xx Cover removal (if needed).

- Fig. — Location of Terminal Boards
- TABLE — OPTION CONNECTIONS

4. INSTALLATION AND CONNECTIONS PROCEDURES

- 4.01 Introduction. The following paragraphs are included if necessary.

4.xx Adjusting (alignment) procedures. Procedures for determining that an adjustment is needed (or to determine the magnitude of the adjustment) and method for making the adjustment. Measuring equipment connections and location of adjustable components should be illustrated if necessary.

4.xx Connecting procedures. Instructions and procedures or references to tables, drawings, or lists showing how the apparatus is connected to customer and telephone company equipment and facilities.

5. POST-INSTALLATION TEST REQUIREMENTS

5.01 Introduction. Reference to test (-500) practice which lists tests that are required to verify correct installation, or statement specifying method for verifying correct installation.

5.xx Installation verification. Procedure for connecting and operating test equipment which operates the data apparatus, verifying that the installation is correct.

MAINTENANCE PRACTICES

A. Apparatus and Station Maintenance Practices

5.55 Maintenance practices (59X-YYY-300) or (59X-8YY-3ZZ) define the recommended policy for maintaining data stations and data apparatus, and specify the actions and methods required to implement the policy. The practices contain information which will permit the operating companies to establish and maintain an effective maintenance

program and instructions which will permit the craft employee to troubleshoot and repair the station or apparatus quickly and efficiently.

5.56 Data stations and apparatus are maintained as part of a system. General maintenance and specific system practices recommend standard policies for investigating system troubles to isolate the trouble cause to one of the system components. Whenever the system investigation indicates that the data apparatus or station is the source of the

trouble, the practice refers to the apparatus maintenance practice for further information and instructions. The apparatus or station maintenance practice specifies the activities required to restore the apparatus to normal. For simple apparatus, where the maintenance policy calls for replacement of the apparatus and the activities required for restoral are easily understood, the information needed to restore service may be included in the Test (-5ZZ) practice, and the Maintenance (-3ZZ) practice omitted. If additions to or deviations from the system maintenance procedures are required because of the characteristics of the apparatus being covered or the system in which the apparatus is used, the apparatus or system maintenance practice will specify the activities required to isolate trouble-causing components of the system.

Contents

5.57 The information and instructions in station and apparatus maintenance practices are normally contained in three parts: Part 1, General; Part 2, Trouble Isolation Procedures; and Part 3, Repair Procedures. Part 4, Restoral Verification, can be used as required.

5.58 In addition to the standard information concerning the practice, Part 1, GENERAL, contains the general recommendations for establishing the maintenance program. The maintenance policy for apparatus and stations is defined by specifying the repair policy (replacement of the apparatus as a unit or replacement of components), the disposition of removed apparatus or parts, the number or percentage of spares recommended to support the stations in service, and the application of the standard maintenance policy. This information should be in concise statements (in most cases with standard wording) and tables. If it is necessary to deviate from or expand the standard maintenance policy, the reasons for the changes must be clearly explained and subparts in Part 2 referenced for detailed instructions. Part 1 also contains general precautions that are required and a list of other BSPs and documents that may be helpful during maintenance activities.

5.59 Part 2, TROUBLE ISOLATION PROCEDURES, contains instructions and information which

permit the maintenance employee to isolate the trouble-causing component. In apparatus practices where the policy requires that the apparatus be replaced, and when system or station procedures do not specifically identify the apparatus as the trouble-causing component, this part is titled TROUBLE VERIFICATION PROCEDURES and contains procedures that prove that the apparatus is defective. If the apparatus Test (-500) practice contains procedures that may be used for this purpose, the contents of Part 2 may consist of a reference to these procedures. For stations and apparatus *not* replaced as a unit, however, Part 2 contains a list of sources of information that may be used to isolate trouble. Instructions for using the information thus obtained are also included. Wiring information may be included in this part if limited wiring information is required. In circumstances where significant information may be obtained during a conversation with the customer, instructions and precautions for discussing the problem are included. The primary contents in Part 2, however, should be the flow chart and accompanying procedures specifying the sequence and direction for the trouble investigation. A procedure or a reference to procedures in the test (-500) practice which verify that the maintenance activities have resolved the trouble and that the customer may resume data transmission are also included in the part.

5.60 Part 3, REPAIR PROCEDURES, contains the step-by-step instructions for removing and replacing covers, housings, circuit packs, and other replaceable components. For large installations (multiple stations, etc) the procedures for removing and replacing components of the station (data sets, data units, etc) are also provided. If the removal or replacement of the components must be done in a specified sequence, the sequence must be explained preceding the procedure. Procedures specifying how adjustable components are realigned are included when required.

5.61 Part 4, RESTORAL VERIFICATION, contains information on tests in the Test (-500) practice needed to verify that service has been restored. In some cases this information may be included in Part 2.

DATA APPARATUS AND STATION MAINTENANCE PRACTICES TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 Apparatus or station maintenance policy. Statement identifying the recommended policy for maintaining the apparatus.
- 1.xx General precautions to be observed before, during, and after performing maintenance activities.
- 1.xx Maintenance aids. List of other documents that will aid in maintaining the apparatus but are not mandatory. Other BSPs that the maintenance employee *must have* but may not normally have in his possession should be listed in a READ. If replacement or adjustment instructions consist of a reference to the installation practice, the READ should so indicate.

2. TROUBLE ISOLATION PROCEDURES

(This part is entitled TROUBLE VERIFICATION PROCEDURES if the trouble is not further isolated to a component of the apparatus. The procedures consist of test instructions or references to tests in the test practice.)

- 2.01 Introduction. Statements identifying the contents and application of the procedure.
- 2.xx Sources of information—trouble report (from DTC operator, etc), trouble history files, customer conversations, etc—and methods for using the sources.

- 2.xx Suggested questions for customer.

Note: Precautions to be observed in discussing troubles with customer.

- 2.xx Trouble isolation. Procedure and flowchart specifying the sequence of testing and analysis of test results to locate trouble-causing components.

- 2.xx Service restoral verification.

3. REPAIR PROCEDURES

- 3.01 Introduction. Statements identifying contents and application of contents.

- 3.xx Procedures, when applicable, for gaining access to internal components of the apparatus (removing covers, etc); for adjusting or aligning components or strapping pads; for removing and replacing circuit packs, data units, etc. The procedure should be illustrated with photographs, exploded-view drawings, etc.

4. RESTORAL VERIFICATION (if needed)

- 4.01 Introduction or reference to tests in test practice.

- 4.xx If the test practice does not have a verification test, procedures specifying how service restoral can be verified should be included here.

B. System Maintenance Practices

Contents

- 5.62 System maintenance practices have information and instructions in two parts: Part 1, General, and Part 2, Trouble Isolation Procedures.
- 5.63 Part 1, GENERAL, contains essentially the same type of information as the station and

apparatus practices. The maintenance policy for systems, however, is concerned with the overall objectives of the maintenance program, and the coordination and system controls involved.

- 5.64 The information in Part 2, TROUBLE ISOLATION PROCEDURES, includes the same topics that are contained in the station and apparatus practices. The system-oriented trouble isolating procedures, however, should emphasize

isolation of a defective system component as rapidly as possible so that service can be restored to the remainder of the system.

DATA SYSTEM MAINTENANCE PRACTICE TYPICAL OUTLINE

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| <p>1. GENERAL</p> <p>1.01 Scope and purpose of practice.</p> <p>1.02 Revision notice (if needed).</p> <p>1.03 System maintenance policy. Objectives of the maintenance activities and recommended methods for carrying out these activities (criteria for selection of a system maintenance center; responsibilities of personnel at the center, at testboard locations, and other central offices; report escalation, etc).</p> <p>1.xx General precautions to be observed before, during, and after performing maintenance activities.</p> <p>1.xx Maintenance aids. List of documents to aid in maintaining the system but which are not mandatory.</p> | <p>2. TROUBLE ISOLATION PROCEDURES</p> <p>2.01 Introduction. Contents and application of the procedures.</p> <p>2.xx Sources of information and methods for using the sources.</p> <p>2.xx Suggested questions for customer. Precautions and suggestions for discussing trouble symptoms with the customer.</p> <p>2.xx Trouble isolation procedures and flowcharts specifying the sequence of testing, how to analyze the test data and other information, and the direction and coordination that should be provided to Telco personnel at other locations.</p> <p>2.xx Service restoral verification. If the system test practice does not include a restoral verification test or if a system test practice does not exist, procedures specifying how the test is to be made are included here.</p> |
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WIRING INFORMATION PRACTICES

5.65 Wiring Information practices (59X-YYY-4ZZ for data apparatus and 59X-8YY-4ZZ for stations) contain information that will permit maintenance personnel to isolate troubles to the wiring on a chassis or to components such as key strips, relays, transformers, filters, or key telephone units (mounted either on the chassis or external to the data apparatus). These instructions should improve the capacity of the maintenance personnel to find and repair faults in data installations. Wiring Information practices are prepared for selected data stations and data apparatus that is maintained in the field. Wiring Information practices can also be provided for common-use data units or data mountings. Data apparatus requiring only one or two small drawings for wiring information do not necessarily require a separate Wiring Information practice. The wiring information in

these cases may be included in the Maintenance (-3ZZ) practice for the apparatus.

5.66 The information is presented in a manner that makes it possible to physically locate components with the apparatus or equipment. Wiring diagrams and tables are used to show how the components are connected. In station arrangements using common-purpose apparatus (data units, data mountings, etc), the Wiring Information practice for the station aids in isolating a trouble to the common-purpose apparatus and references the practice for the apparatus for detailed trouble isolation. The station wiring information practice is limited to identifying input and output terminals and showing the path of the circuit through the apparatus. The circuit path will include, in functional symbols, the contacts and components in the apparatus. Details such as stand-off terminals and cable or wire routing are not included in the station practice but are included in the apparatus practice.

The apparatus wiring information practice identifies the interconnection between the input and output terminals. Wiring details such as stand-off terminals and wire routing are included.

Contents

5.67 The contents of Wiring Information practices are normally in two parts: Part 1, General, and Part 2, Wiring Information.

5.68 Part 1, GENERAL, contains, in addition to the standard information concerning the practice, information of a general nature on locating and repairing wiring troubles for the apparatus or station. This includes a statement of practice limitation (such as models, series, or components that are not covered) when necessary; standard

checking and repair instructions for the wiring or circuit components in the apparatus or station; and general precautions that must be observed while checking the apparatus or station.

5.69 Part 2, WIRING INFORMATION, contains a list of the illustrations or tables in the part showing the number, title, and page number of each figure. If tables are used to show wiring information, the tables should be included in the list. The illustrations should be presented in as compact manner as possible, ie, the pictorial and wiring diagram for one model should be on the same sheet. The information should be presented in the sequence that is normally required during trouble isolation with the most general information first and the most detailed last.

WIRING INFORMATION PRACTICE TYPICAL OUTLINE

1. GENERAL

1.01 Scope and purpose of practice.

1.02 Revision notice (if needed).

1.03 Limitations in coverage. References to BSPs with detailed coverage if needed.

1.xx General repair instructions for replacing wires or components in the apparatus or station.

1.xx General precautions for checking and repairing wiring.

2. WIRING INFORMATION

2.01 Information on illustrations and tables and how they are used to verify apparatus or equipment wiring.

FIG. or TABLE	TITLE	PAGE
• Wiring diagrams or tables.		

TEST PRACTICES

5.70 Test practices for data stations (59X-8YY-5ZZ) and apparatus (59X-YYY-5ZZ) provide the specific instructions required by the craft employee for testing the data station or apparatus. Procedures for verifying the installation and for trouble investigation are included, if applicable. The procedures are keyed to the requirements of the installation and maintenance practices.

5.71 The contents are based on the assumption that the craft employee has been properly prepared, equipped, and trained. This permits the contents of test practices to be limited to the

specific information required by the average craft employee to perform the tests efficiently. The step-procedure format is used as an example. In some instances, eg, where many requirements must be met, step-action-verification may be appropriate.

Contents

5.72 Test practices normally contain Part 1, General; Part 2, Installation Test Procedures; and Part 3, Maintenance Test procedures.

5.73 Part 1, GENERAL, contains the standard information concerning the practice and

general information concerning all of the tests. The general information should include, if applicable to *all* tests, the list of test equipment and the recommended remedial action. Instructions and precautions which are required specifically by the apparatus being covered should also be included. A brief description of the features which are checked in each test allows the tester to determine which tests apply to a particular situation when the titles of the tests do not make this clear.

5.74 Parts 2, INSTALLATION TEST PROCEDURES, and 3, MAINTENANCE TEST PROCEDURES, contain the information and instructions for making each required test. In cases where the same tests performed after installation and during a maintenance visit, the test instructions should be contained in Part 2. If it is not possible to divide the test procedures into categories of installation and maintenance, information on sequence of tests, and criteria for determining which test shall be run in a particular situation must be included in the introductory material to the test procedures. If installation or maintenance test procedures are not required, the inapplicable part should be omitted.

5.75 Each test procedure should be presented separately under a subpart heading, and be as independent as possible of other test procedures. In cases where a subsequent procedure depends on the successful completion of one or more previous procedures, this fact must be clearly stated in the introductory paragraph for the part. Each subpart heading should specifically identify the test that is included and be compatible with the terminology in the Maintenance, Installation and Connection, and the Supplementary Information practices.

5.76 The information required for each test is as follows:

- (a) Basic purpose of the test
- (b) The test equipment required for the test
- (c) The step-by-step procedure for performing the test

- (d) The requirements and tolerance which indicate successful completion of the test

- (e) Action which must be taken if the test fails.

5.77 The purpose of the test should briefly explain what the test is intended to show. For example, a frequency response test should be explained as "checking the ability of the receive filter and the detector to properly react to in-band frequencies and reject out-of-band frequencies" and not as "checking the frequency response of the data set."

5.78 The test equipment required for the test should be identified and its use indicated in a list. If the same test equipment is used for all tests, one list in Part 1, GENERAL, should be used rather than repeating the list for each test.

5.79 The procedures should specify precisely what the employee must do to connect and adjust the test equipment correctly and to condition the data apparatus. Complex test setups should be illustrated to avoid long, confusing procedural instructions for connecting the test equipment. The procedures must also include complete instructions for wiring in options which are specifically required for the test, for setting controls and switches, and other actions required to adjust the data apparatus to the proper mode of operation.

5.80 *Remedial action* for tests which fail to meet the requirements, if not specified in the maintenance practice, should follow each test. The action may be a reference to another test for further isolation of the trouble or a specific action, such as "Replace AR1 CP." In cases where the maintenance policy requires that the apparatus be replaced as a unit to restore service, the remedial action for each test that fails will be to replace the apparatus. In these cases, a statement to this effect should be included in Part 1, GENERAL, and the remedial action part of the procedures omitted.

STATION OR APPARATUS TEST PRACTICE
TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 General instructions and precautions common to all tests. If applicable, list of test equipment and remedial actions required when a test fails.

2. INSTALLATION TEST PROCEDURES

- 2.01 Introduction. Tests and circumstances which control application of test procedures (sequence of testing, etc).

A. Test 1 (Title of Test)

- 2.xx Purpose of test.
- 2.xx Test equipment required (if needed). List identifying the type of test equipment, the identifying number, and the term "or equivalent" if other models are acceptable, and if needed, the application of the test equipment. For complex test hookups, a reference to a test connection diagram.

• Fig. — Test Connection Diagram (Test 1)

2.xx Test procedure

STEP	PROCEDURE
1	
2	

Requirement:
Remedial action:

B. Test 2 (Title of Test)

- 2.xx Same format as Test 1.

3. MAINTENANCE TEST PROCEDURES

3.01 Introduction.

A. Test 1 (Title of Test)

- 3.xx Same format as Part 2.

DATA SERVICES MANUAL

5.81 Selected information and instruction for craft employees are included in a manual covering stations and apparatus used to provide data services. The information and instructions are limited to those required by experienced personnel to install and maintain common arrangements of the station or apparatus. The standard practices for the station or apparatus must be used if installation or maintenance details or information concerning special arrangements are required.

5.82 The manual is reissued periodically as necessary to make major changes and add information and instructions.

Contents

5.83 The contents of the manual are arranged in Part I, General Information; and Part II

and succeeding parts, data apparatus information (indexed by data set type) which includes information on selected data sets, data auxiliary sets, data stations, and data access arrangements. A table of contents precedes Part I.

5.84 Part I, GENERAL INFORMATION, contains a series of tables and charts presenting the transmission requirements for channels used with the apparatus and stations included in the manual. (This includes the types of data sets, identified by bit rate, and information on the 3002 channel with C1, C2, and C4 conditioning.)

5.85 Each part beginning with Part II covers an apparatus series (eg, data set 200-type), and is divided into subparts for each apparatus. The subpart title is the code and nomenclature of the item covered (eg, data set 202R-type). Each subpart begins with brief introductory information identifying the unit. The identification should

consist of statements describing the purpose and function of the unit and identifying the environment in which the unit is used. An illustration showing the external appearance should be included.

5.86 The specific information on each data set or data auxiliary set is limited to information which is applicable to the majority of data installations and which can be provided in abbreviated form.

DATA SERVICES MANUAL TYPICAL OUTLINE

I. General Information

- TABLE—SWITCHED NETWORK DATA-PHONE TRANSMISSION REQUIREMENTS
- TABLE—EIA INTERFACE INFORMATION
- TABLES—PRIVATE LINE TRANSMISSION REQUIREMENTS

II. Data Set 100-Type

Under each data set or data set type, the following outline is covered generally.

1. DESCRIPTION

General description of data set (type transmission, etc). Figure showing external view of data set; tables of interface information.

2. CONNECTIONS

Figures and/or tables showing connections.

3. OPTIONS

Figures and tables of Telco and customer options.

4. TESTING

Table and/or procedure describing testing.

5. REFERENCES

List of BSPs, CD, SDs, Technical References, etc.

III. Data Sets 200-Type

Same format as II.

IV. Data Sets 400-Type

Same format as II.

V. Data Auxiliary Sets

1. GENERAL

2. CONNECTIONS

3. OPTIONS

4. REFERENCES

VI. Data Access Arrangements

1. GENERAL

2. CONNECTIONS

3. TESTING

4. REFERENCES

VII. Channel Service Unit

1. GENERAL

2. CONNECTIONS

3. OPTIONS

4. TESTING

5. REFERENCES

VIII. Data Service Unit

1. DESCRIPTION

2. CONNECTIONS

3. OPTIONS

4. TESTING

5. REFERENCES

6. EQUIPMENT PRACTICES**GENERAL**

6.01 Equipment practices on data systems and data stations are prepared to assist telephone company engineering personnel in designing data installations. The responsibility for preparing the practices for individual pieces of equipment lies with BTL. An Equipment practice defines the permissible configurations of the system or station it covers in terms of the hardware that is required and the design criteria for the installation. A system practice identifies all station configurations that may be used and discusses the circumstances and conditions that may lead to the selection of the station that best fits the service requirements. Station Equipment practices cover apparatus in a similar manner.

6.02 The Equipment practice discusses the functional environment in which the system or station operates. The requirements and limitations imposed on the system or station by peripheral equipment and facilities, and vice versa, are discussed. Information is provided which enables the engineer to select the hardware and the options required to implement the service.

6.03 System information may be included in a station practice if the system consists of identical stations. If the system consists only of a few relatively simple station configurations, the station information may be included in the system practice.

CONTENTS

6.04 Information in the Equipment practice normally is presented in six parts: Part 1, General; Part 2, Supplementary Information; Part 3, Drawings; Part 4, Equipment; Part 5, General Notes; and Part 6, Reasons for Reissue (reissued practices only). The information must be arranged

to fit the particular circumstances of the system or station to be covered; the contents of these practices should be adjusted when necessary to fit these circumstances, but the general content requirements should be met.

6.05 Part 1, GENERAL, contains information of a general nature to indicate the areas covered by the BSP, the type of equipment covered, and its application. The information should include specifications on the equipment and other data required to select the equipment for a particular application.

6.06 Part 2, SUPPLEMENTARY INFORMATION, contains the reference information showing subdivisions of equipment, an index of circuit schematics, and BSPs that are relevant to the application of the equipment.

6.07 Part 3, DRAWINGS, contains a list of the drawings (including all J-coded and ED group equipment) required to engineer and install the apparatus, equipment or system involved.

6.08 Part 4, EQUIPMENT, lists in single-paragraph or tabular form all the units which make up the overall equipment. This part may include units which are part of the system but are covered by other Equipment practices.

6.09 Part 5, GENERAL NOTES, contains notes on restrictions and requirements applicable to various arrangements of equipment. These notes can include required or prohibited options, required transmission and maintenance facilities, or any other design criteria needed by the engineer to instruct the personnel performing the installation.

6.10 Part 6, REASONS FOR REISSUE, is included in reissued sections only and contains a listing of those items which have been changed since the previous issue.

EQUIPMENT PRACTICE TYPICAL OUTLINE

1. GENERAL

- 1.01 Scope and purpose of practice.
- 1.02 Revision notice (if needed).
- 1.03 Purpose and function of system or station.
Brief identification of the type of service provided and the principles used to provide the service.
- 1.04 General system or station characteristics and specifications. Lists or tables identifying quantitative factors concerning the system or station.

2. SUPPLEMENTARY INFORMATION

- 2.01 Introduction.
- 2.02 References, index of circuit schematics, BSPs.

3. DRAWINGS

- 3.01 Introduction.

(TITLE) ARRANGEMENT

- 3.02 List of drawings for equipment, cabling, etc.

4. EQUIPMENT

- 4.01 Introduction.
- 4.02 Listing of equipment groups by equipment code.

5. GENERAL NOTES

- 5.01 Introduction.
- 5.02 Notes on restrictions and requirements.

6. REASONS FOR REISSUE

7. SUPPLEMENTARY INFORMATION PRACTICES

GENERAL

7.01 The Supplementary Information practices (59X-YYY-15Z) are prepared for telco engineering and experienced maintenance personnel, and cover data apparatus, stations, and systems. The practices provide information for associated telephone company engineers and maintenance employees which permits them to identify and correct trouble conditions not covered by standard procedures. To accomplish these purposes, the practice supplements the information in the standard series covering the data set, station, or system. The descriptive information can be written to a somewhat higher level and describes the apparatus in a greater depth than the standard Description and Operation practice. The test instructions provide means for checking the apparatus in greater detail and will specify the use, when necessary, of more elaborate and sophisticated test equipment than that in the Test (-500) practice.

7.02 The standard series of practices are intended to provide the average installation and

maintenance employee with the specific knowledge required for a normal, uncomplicated maintenance visit. The Supplementary Information (-150) practice is intended to provide knowledge required for out-of-the-ordinary maintenance and test activities that are necessary when routine maintenance fails to disclose the source of a trouble.

7.03 The information in the standard practices is primarily specific, with the general background information limited only to that which is required to ensure that the employee understands what he is normally expected to do. The -150 practice information, however, emphasizes the how and why of the characteristics and functions of the apparatus so that the employee can gain the comprehensive knowledge required for intelligent decisions about the application and maintenance of the apparatus.

7.04 The -150 practices are written for telco engineers and for experienced, qualified maintenance personnel. These employees have the background and capacity to understand new or complex circuits and concepts. They are able to analyze and understand simple circuits from drawings alone, either in the practice or in SDs.

CONTENTS

7.05 Supplementary Information practices are as brief and concise as possible, consistent with the amount and complexity of information which must be presented. Tables, lists, and illustrations are used, where practicable, to condense information. More complex information, which cannot be effectively presented in a condensed form, is presented in concise narrative form to avoid confusion and possible misunderstanding. The information is normally presented in six parts: Part 1, General; Part 2, Equipment Characteristics (Data Set, Station, or System); Part 3, Equipment Capabilities (Data Set, Station, or System); Part 4, Theory of Operation; Part 5, Maintenance and Tests; and Part 6, References.

7.06 In addition to the standard information about the practice, Part 1, GENERAL, establishes a common base of understanding between reader and writer by briefly describing the basic purpose (what the hardware will do for the customer), function (how the hardware accomplishes its purpose), and the relationship of the hardware to the system in which it operates. Based on this common understanding, the practice then provides a list and explanation of the characteristics in Part 2 and the capabilities and limitations of the hardware in Part 3. This explanation provides the employee with the knowledge required to determine if the hardware can be used in a specific application or if circumstances or system criteria can be modified to permit usage of the hardware.

7.07 The brief description of the function of the apparatus and the explanation of the characteristics are further expanded by Part 4, THEORY OF OPERATION. The basic functions of the hardware are separated into detail functions and described in text and illustrations. The depth of the description is determined by the complexity of the hardware and the maintenance level of the apparatus or equipment. For example, if a data set or station provides forward-channel data transmission and reverse-channel capabilities for the customer, the basic functional circuits are the forward channel transmitter and the reverse-channel receiver. A block diagram in the introductory part would show two appropriately labeled blocks to represent the data set. Each of the two basic functional circuits could include two or more detailed circuits such as an interface circuit, a modulator, and a line coupling circuit in the transmitter. If

required for trouble isolation, each of these detailed circuits would appear as blocks in the detailed theory of operation block diagram and explained accordingly. If, in this example, the modulator and line coupler were conventional, further description of these circuits could consist of a reference to the SD or CD or, at most, a brief paragraph identifying the circuit by type and function and a simplified schematic. On the other hand, if the interface circuit was new or relatively complex, it would be described in detail in text and schematic drawings. In general, the depth of coverage need only be to a level which aids the user in determining if replaceable components are operating properly.

7.08 Part 5, MAINTENANCE AND TESTS, is presented as procedural instructions specifying the methods and results for testing the detail circuits and functions of the hardware under field conditions. The tests will supplement the craft Test practice by providing instructions for more elaborate and comprehensive measurements. The purpose of the test, circuit, or function being tested is explained so that corresponding tests in the -150 and -500 (Test) practices can be identified. If necessary these tests specify the use of oscilloscopes, frequency counters, and other test equipment not normally required in the test practice. Information is included in the procedures to permit the identification of a circuit pack or chassis-mounted component that is the source of the trouble. Procedures and other information are provided to permit a detailed examination of the interface circuits. Timing, sequence, waveshape, and other characteristics of the interface signals are provided.

7.09 Other documents, BSPs, periodicals, engineering letters, etc, which contain additional information concerning the hardware or concepts that may help in understanding the hardware are listed in Part 6, REFERENCES.

7.10 It is expected that by properly interpreting the results of these tests and applying the knowledge gained from the theory of operation, the employee can locate and correct any malfunction which may occur.

7.11 The general sequence of presentation of this information is shown in the following outline. The outline is intended to be a guide in the preparation of -150 practices. If, for any reason, the information specified in the outline is not applicable to a particular apparatus, the information

should be omitted. Likewise, if additional information is required to adequately cover the apparatus, the information should be included. In order to maintain some degree of consistency between practices,

however, deviation from the outline should be kept to a minimum and limited to that required for adequate coverage of the apparatus.

SUPPLEMENTARY INFORMATION PRACTICE TYPICAL OUTLINE

1. GENERAL

1.01 Scope and purpose of practice.

1.02 Revision notice (if needed).

1.03 Purpose of apparatus.

- Fig. — Photo of Apparatus

1.04 Function of apparatus.

- Fig. — Block Diagram Illustrating Function and Environment of Apparatus

2. EQUIPMENT CHARACTERISTICS (DATA SET, STATION, OR SYSTEM)

2.01 Introduction.

2.02 Interface and line signal characteristics.

2.03 Physical characteristics.

2.04 Power requirements.

2.05 Operating controls and adjustments.

- Fig. — Location of Controls

2.06 Customer and Telco options.

- Fig. — Location of Option Straps

3. EQUIPMENT CAPABILITIES (DATA SET, STATION, OR SYSTEM)

3.01 Introduction.

3.02 Operational capabilities of apparatus.

- Fig. — Characteristic Curves

3.xx Limitation of apparatus.

4. THEORY OF OPERATION

4.01 Introduction

4.02 Functional description.

- Fig. — Detailed Block Diagram

4.03 Specific circuit operation.

- Fig. — Simplified Schematic or Logic Diagram

4.xx Background theory.

- Fig. — Schematic or Other Diagram.

5. MAINTENANCE AND TESTS

5.01 Introduction and sequence of testing (if needed).

5.02 Test procedure (first test).

5.03 Test equipment.

5.04 Procedure

- Fig. — Test Equipment Connection Diagram

5.xx Test procedure (second test). Same format as for first test.

6. REFERENCES

6.01 List of documents relative to the apparatus.

8. TRIAL INSTRUCTIONS**GENERAL**

8.01 Trial Instructions are prepared for apparatus, stations, or systems to be used by BTL/telco engineering and qualified maintenance personnel at selected customer locations to evaluate the feasibility of the service, the adequacy of the design, or to determine customer reaction. The trial models are produced on an expedited schedule and in limited numbers in a model shop. The Trial Instruction covering the model shop apparatus provides all necessary installation and maintenance information for telephone company employees. The instruction is normally used by a somewhat better qualified craft employee because the apparatus is experimental and is subject to unusual troubles and out-of-the-ordinary installation and maintenance problems. The contents of Trial Instructions should be compatible with the nature of the apparatus and the capability of the employee. This requires a greater depth of coverage for the apparatus but allows the Trial Instruction to be written to a higher level.

8.02 Trial Instructions should contain all of the information normally included in the craft practices, as well as the operating instructions for the data test center operator (Testboard and Equipment practices) and as much of the theory of operation and supplementary information as possible (especially maintenance and test procedures).

8.03 In some cases an official SD will not be available for distribution at the time of the trial. In these cases it is desirable to include SD-type drawings in the Trial Instruction.

8.04 Although Trial Instructions should contain all of the information required by the employees for effective maintenance, the contents in many cases are limited by available source information. When source information is not available in time to meet the schedule requirements, it will sometimes be necessary to omit information and instructions that otherwise would be included.

CONTENTS

8.05 The contents of trial instructions are normally arranged in six parts; Part 1, General; Part 2, Description; Part 3, Operation; Part 4, Installation; Part 5, Maintenance; and Part 6, Tests. Inapplicable parts for any particular apparatus should be omitted; eg, if the apparatus is completely automatic, Part 3, OPERATION, should be omitted. Parts which contain relatively small amounts of text may be combined; eg, if the maintenance information consists of a few short paragraphs, the maintenance and test parts may be combined.

8.06 Parts 1, GENERAL; 2, DESCRIPTION; and 3, OPERATION contain the information included in the Description and Operation craft practice. The material, especially the system and apparatus functional description, should be presented in greater depth. Part 4, INSTALLATION, duplicates the contents of the craft Installation and Connection practice. This part should be prepared in accordance with Part 5 of this specification.

8.07 Part 5, MAINTENANCE, contains the maintenance information and is similar to the craft Maintenance practice. This information should be in greater detail and depth, however, because of the experimental nature of the apparatus.

8.08 Part 6, TESTS, contains the instructions for both remote and local testing of the apparatus. Remote tests will be made by the data test center or other centralized test position. The contents and format of these procedures should be similar to that specified for the data test center practices.

8.09 Local testing is done by a telephone company employee at the customer location. These tests are designed to use standard test equipment as much as possible. It may be necessary, however, to specify the use of other test equipment because of the nature of the apparatus. These test procedures should be similar to those contained in the craft Test (-5ZZ) practice, or if other than standard test equipment is used, contained in the Supplementary Information section.

**TRIAL INSTRUCTION
TYPICAL OUTLINE**

- | | |
|--|---|
| 1. GENERAL | 2.02 Functional description. |
| 1.01 Scope and purpose of instruction. | 3. OPERATION (Similar to descriptive practice) |
| 1.02 Purpose of apparatus or system. | 4. INSTALLATION (Similar to Installation and Connections practice) |
| 1.03 Function and application of apparatus or system. | 5. MAINTENANCE (Similar to Installation and Connections practice) |
| 2. DESCRIPTION (Similar to descriptive practice) | 6. TESTS (Similar to Installation and Connections practice) |
| 2.01 Physical description. | |